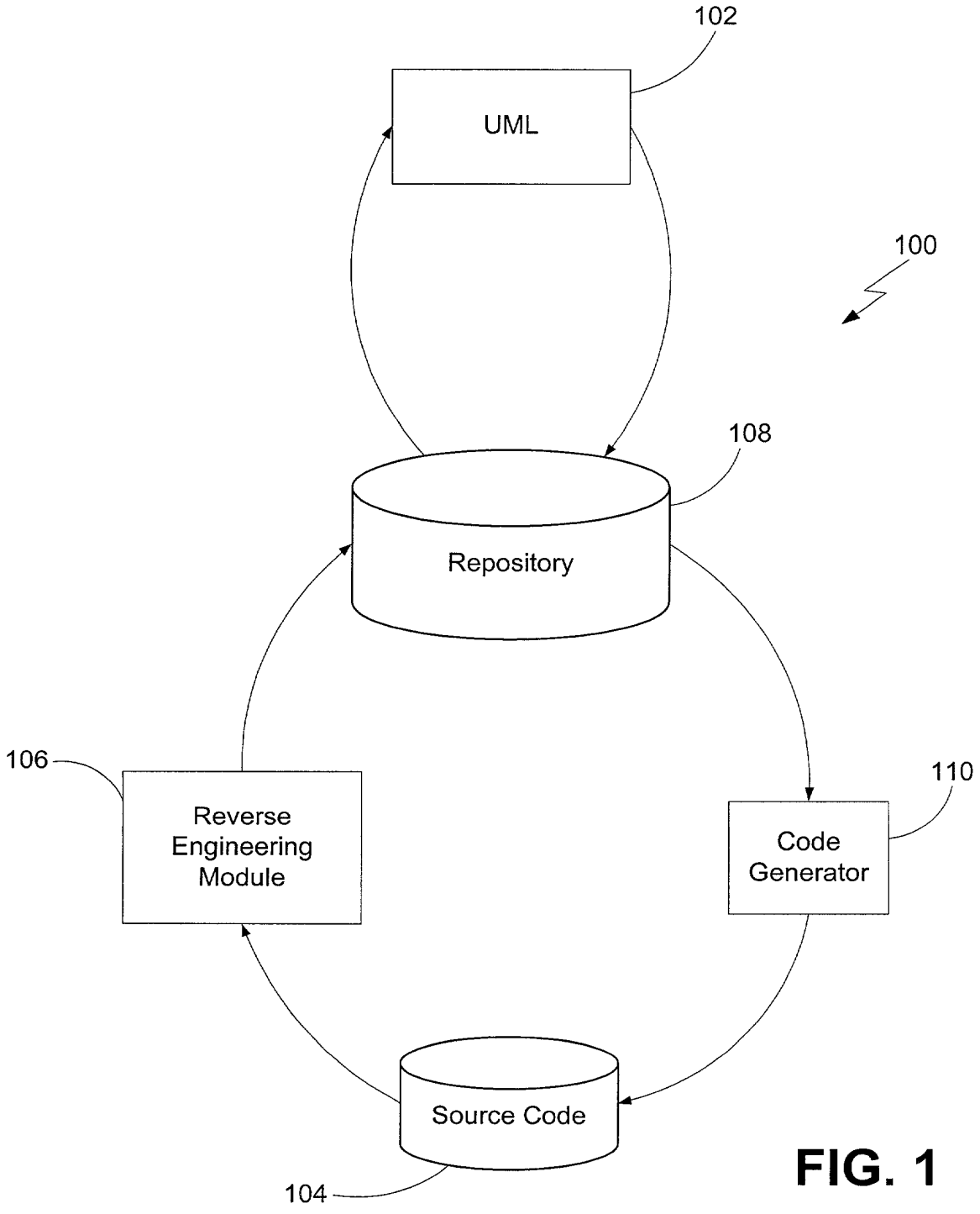


FIG. 1
(Prior Art)

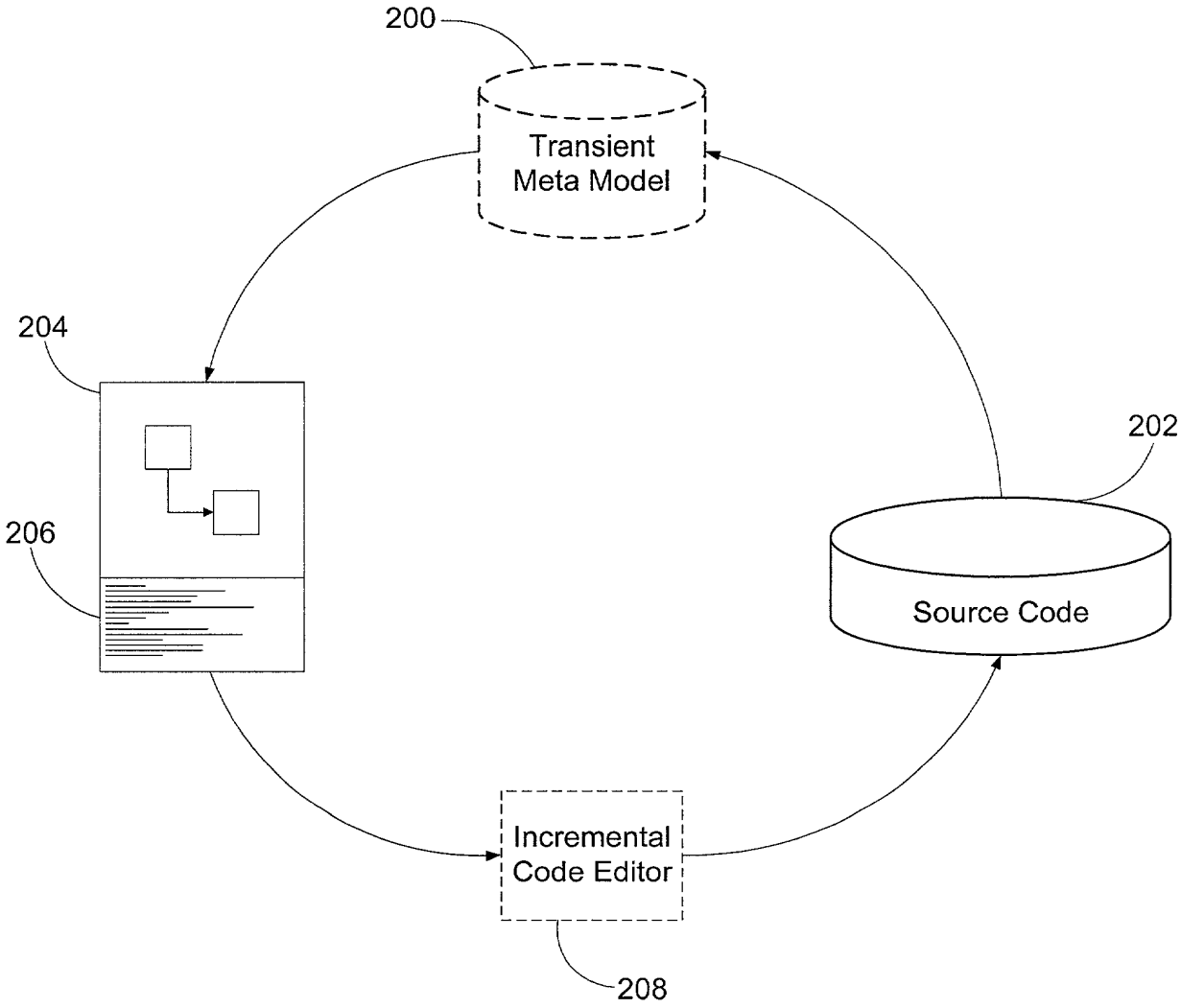

200
Transient
Meta Model
204
206
202
Source Code
Incremental
Code Editor
208

FIG. 2

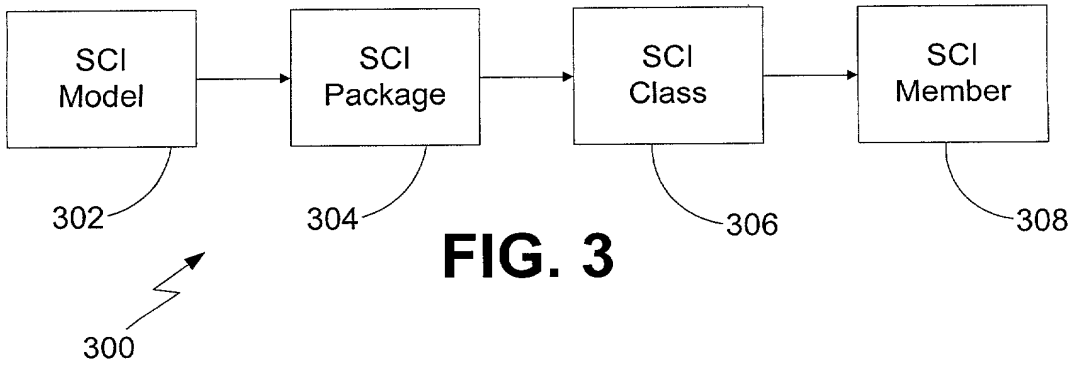


FIG. 3

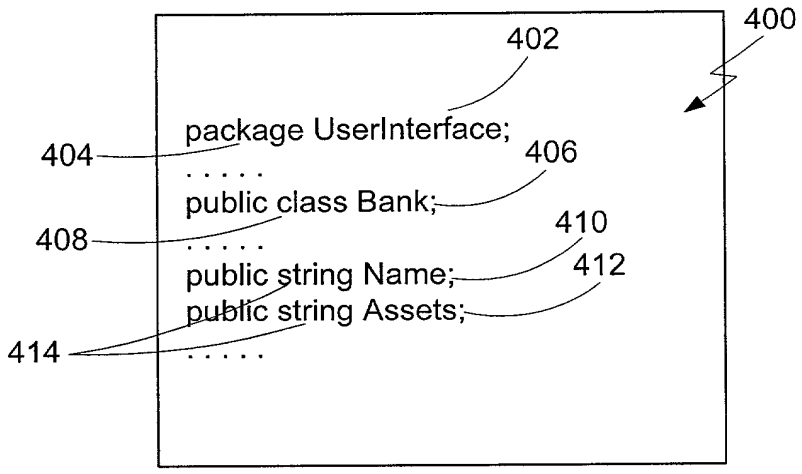


FIG. 4

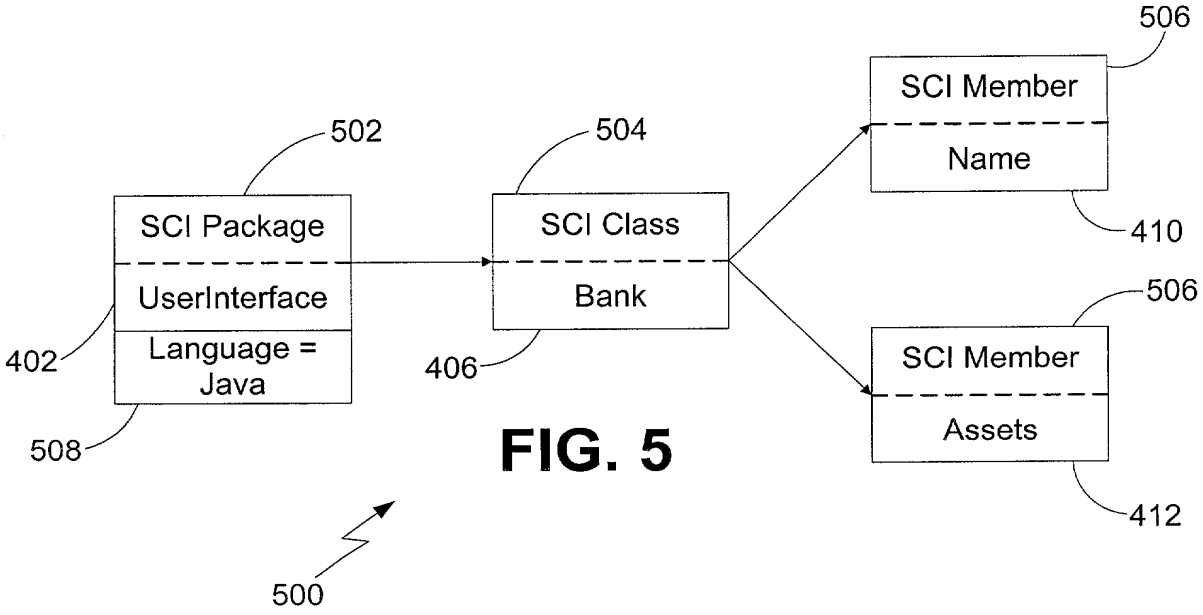


FIG. 5

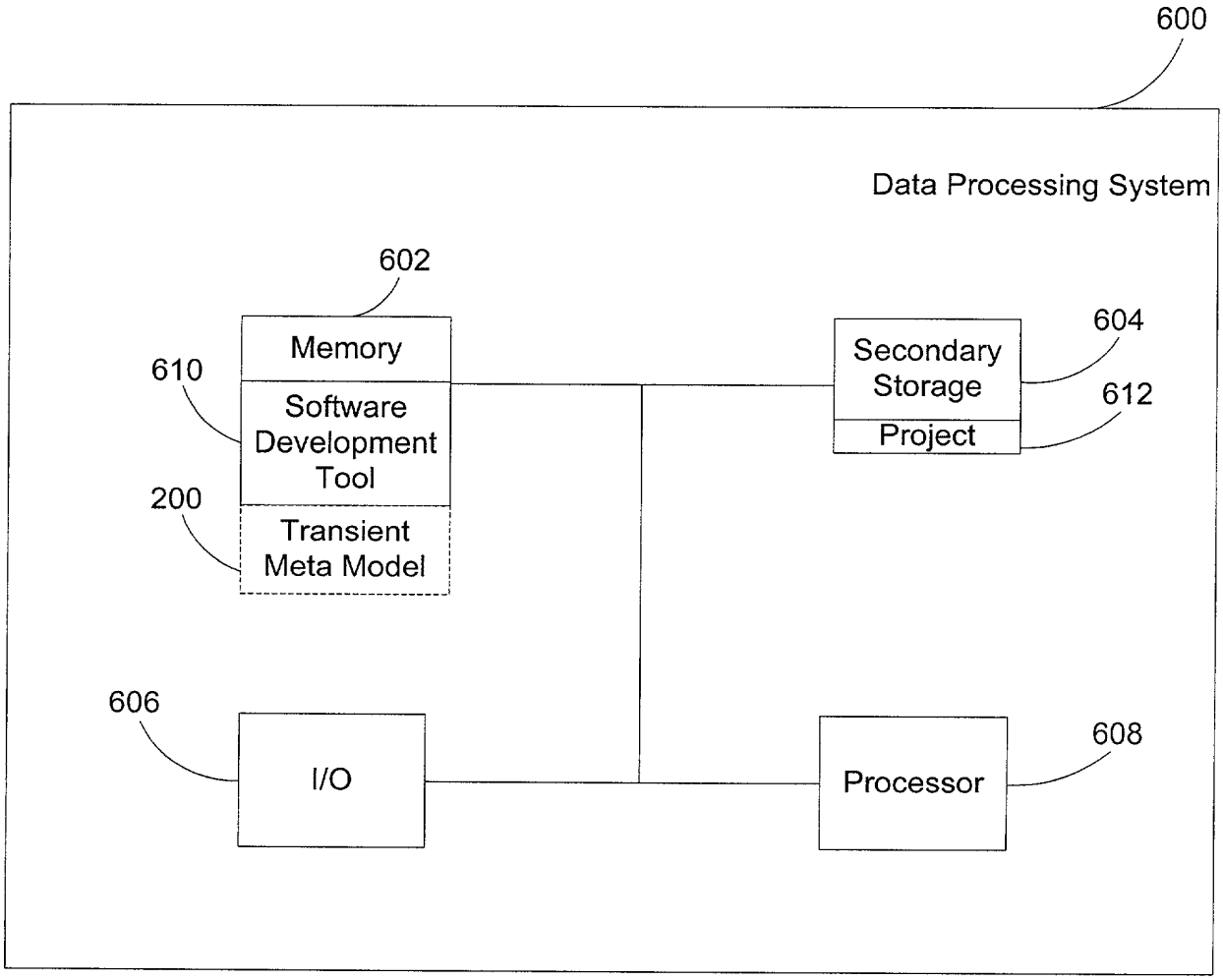

600
Data Processing System
602
Memory
610
Software Development Tool
200
Transient Meta Model
604
Secondary Storage
612
Project
606
I/O
608
Processor

FIG. 6

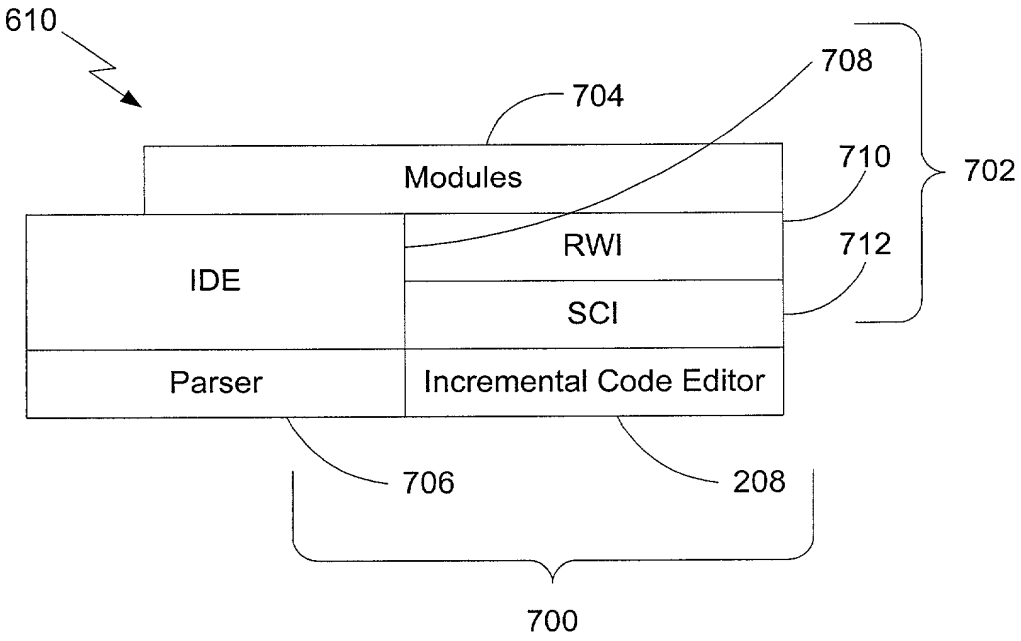

610
708
704
Modules
710
702
RWI
712
IDE
SCI
Parser
Incremental Code Editor
706
208
700

FIG. 7

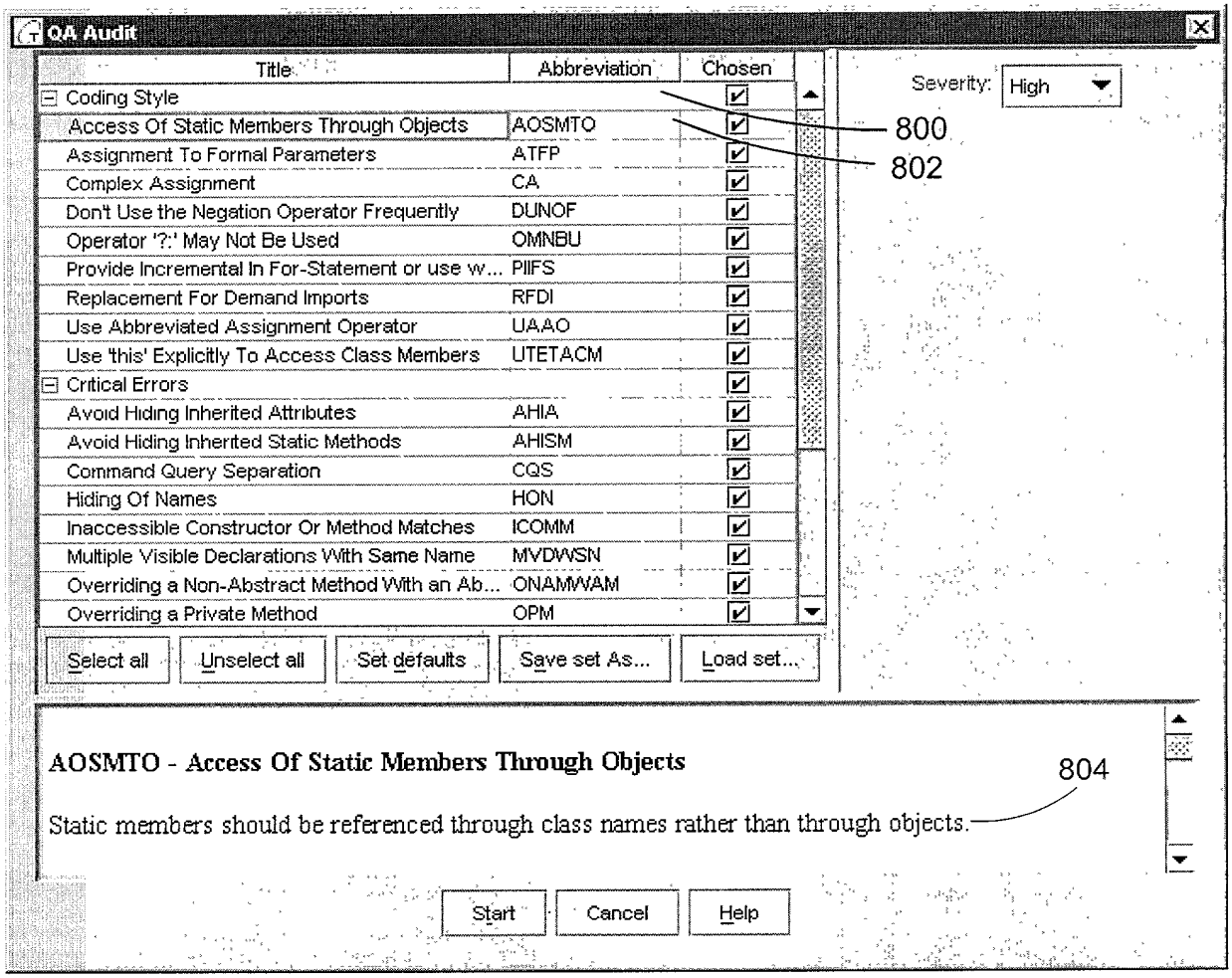

QA Audit
Title
Abbreviation
Chosen
Coding Style
Access Of Static Members Through Objects
AOSMTO
Assignment To Formal Parameters
ATFP
Complex Assignment
CA
Don't Use the Negation Operator Frequently
DUNOF
Operator '?:' May Not Be Used
OMNBU
Provide Incremental In For-Statement or use w...
PIIFS
Replacement For Demand Imports
RFDI
Use Abbreviated Assignment Operator
UAAO
Use 'this' Explicitly To Access Class Members
UTETACM
Critical Errors
Avoid Hiding Inherited Attributes
AHIA
Avoid Hiding Inherited Static Methods
AHISM
Command Query Separation
CQS
Hiding Of Names
HON
Inaccessible Constructor Or Method Matches
ICOMM
Multiple Visible Declarations With Same Name
MVDWSN
Overriding a Non-Abstract Method With an Ab...
ONAMWAM
Overriding a Private Method
OPM
Select all
Unselect all
Set defaults
Save set As...
Load set...
Severity:
High
800
802
AOSMTO - Access Of Static Members Through Objects
804
Static members should be referenced through class names rather than through objects.
Start
Cancel
Help

FIG. 8A

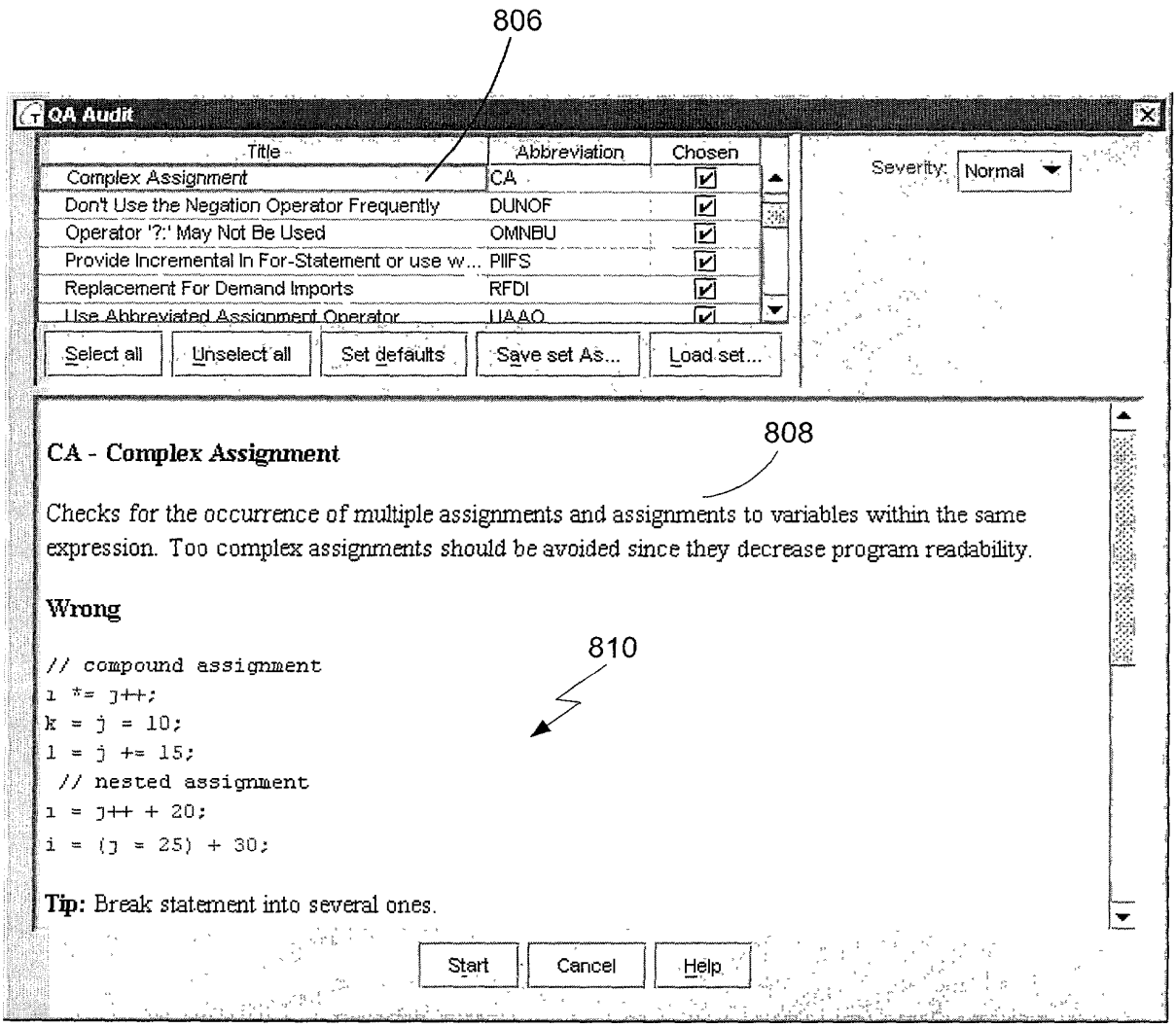

806
QA Audit
Title
Abbreviation
Chosen
Complex Assignment
CA
Don't Use the Negation Operator Frequently
DUNOF
Operator '?:' May Not Be Used
OMNBU
Provide Incremental In For-Statement or use w...
PIIFS
Replacement For Demand Imports
RFDI
Use Abbreviated Assignment Operator
UAAO
Severity:
Normal
Select all
Unselect all
Set defaults
Save set As...
Load set...
808
CA - Complex Assignment
Checks for the occurrence of multiple assignments and assignments to variables within the same expression. Too complex assignments should be avoided since they decrease program readability.
Wrong
810
// compound assignment
i *= j++;
k = j = 10;
l = j += 15;
// nested assignment
i = j++ + 20;
i = (j = 25) + 30;
Tip: Break statement into several ones.
Start
Cancel
Help

FIG. 8B

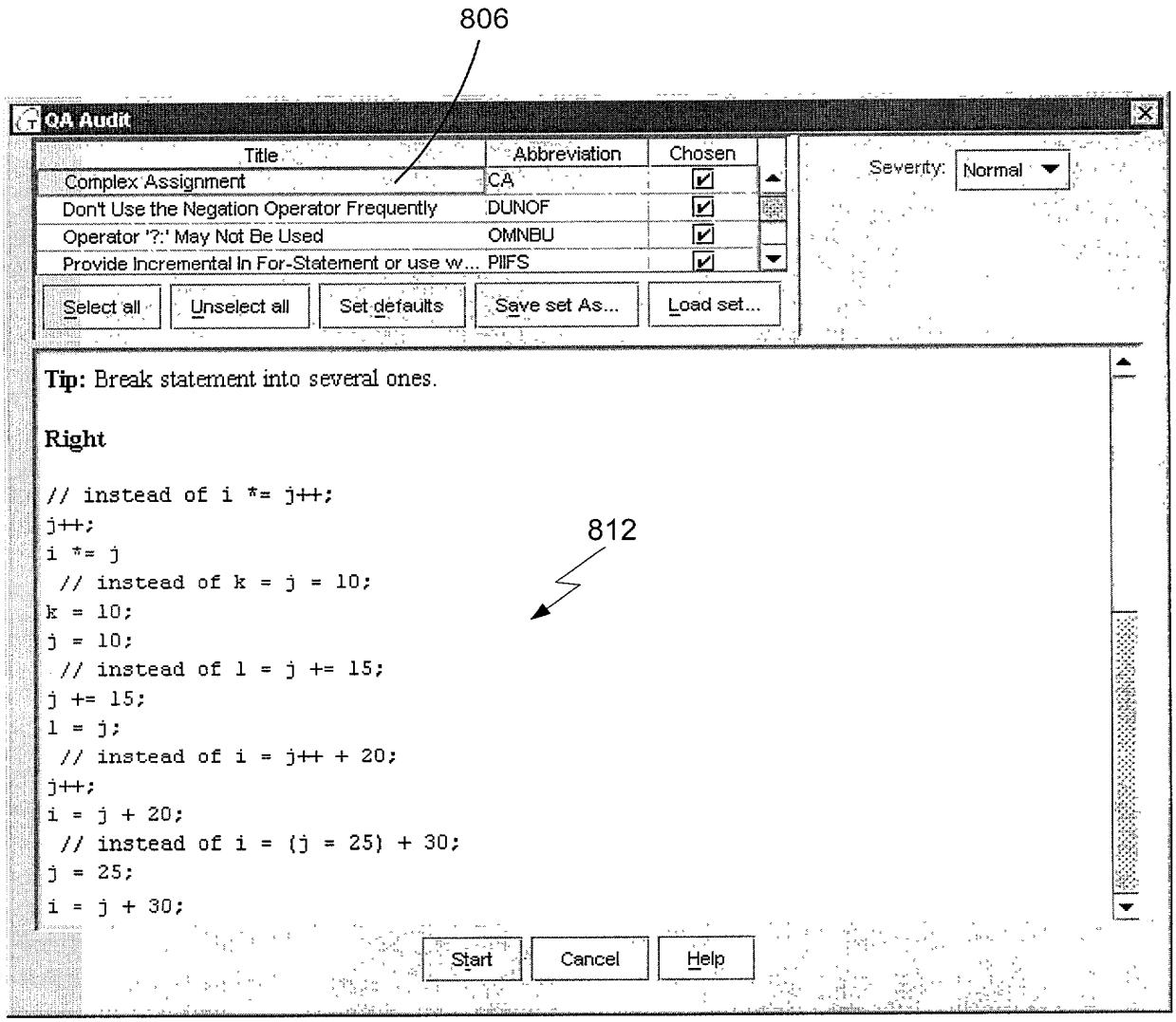

806
QA Audit
Title
Abbreviation
Chosen
Complex Assignment
CA
Don't Use the Negation Operator Frequently
DUNOF
Operator '?:' May Not Be Used
OMNBU
Provide Incremental In For-Statement or use w...
PIIFS
Severity:
Normal
Select all
Unselect all
Set defaults
Save set As...
Load set...
Tip: Break statement into several ones.
Right
// instead of i *= j++;
j++;
i *= j
// instead of k = j = 10;
k = 10;
j = 10;
// instead of l = j += 15;
j += 15;
l = j;
// instead of i = j++ + 20;
j++;
i = j + 20;
// instead of i = (j = 25) + 30;
j = 25;
i = j + 30;
812
Start
Cancel
Help

FIG. 8C

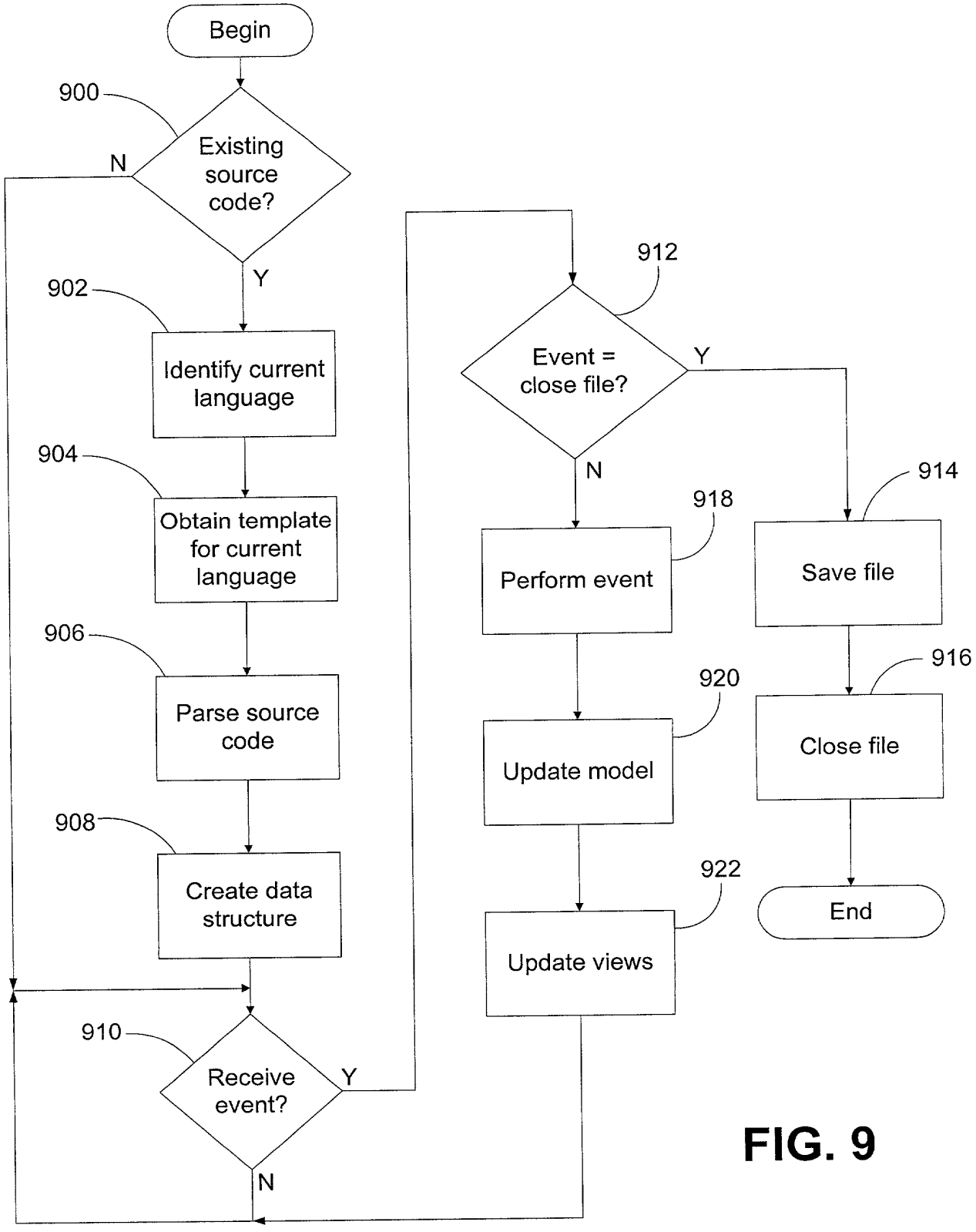

Begin
900
Existing source code?
N
Y
902
Identify current language
904
Obtain template for current language
906
Parse source code
908
Create data structure
910
Receive event?
Y
N
912
Event = close file?
Y
N
914
Save file
916
Close file
End
918
Perform event
920
Update model
922
Update views

FIG. 9

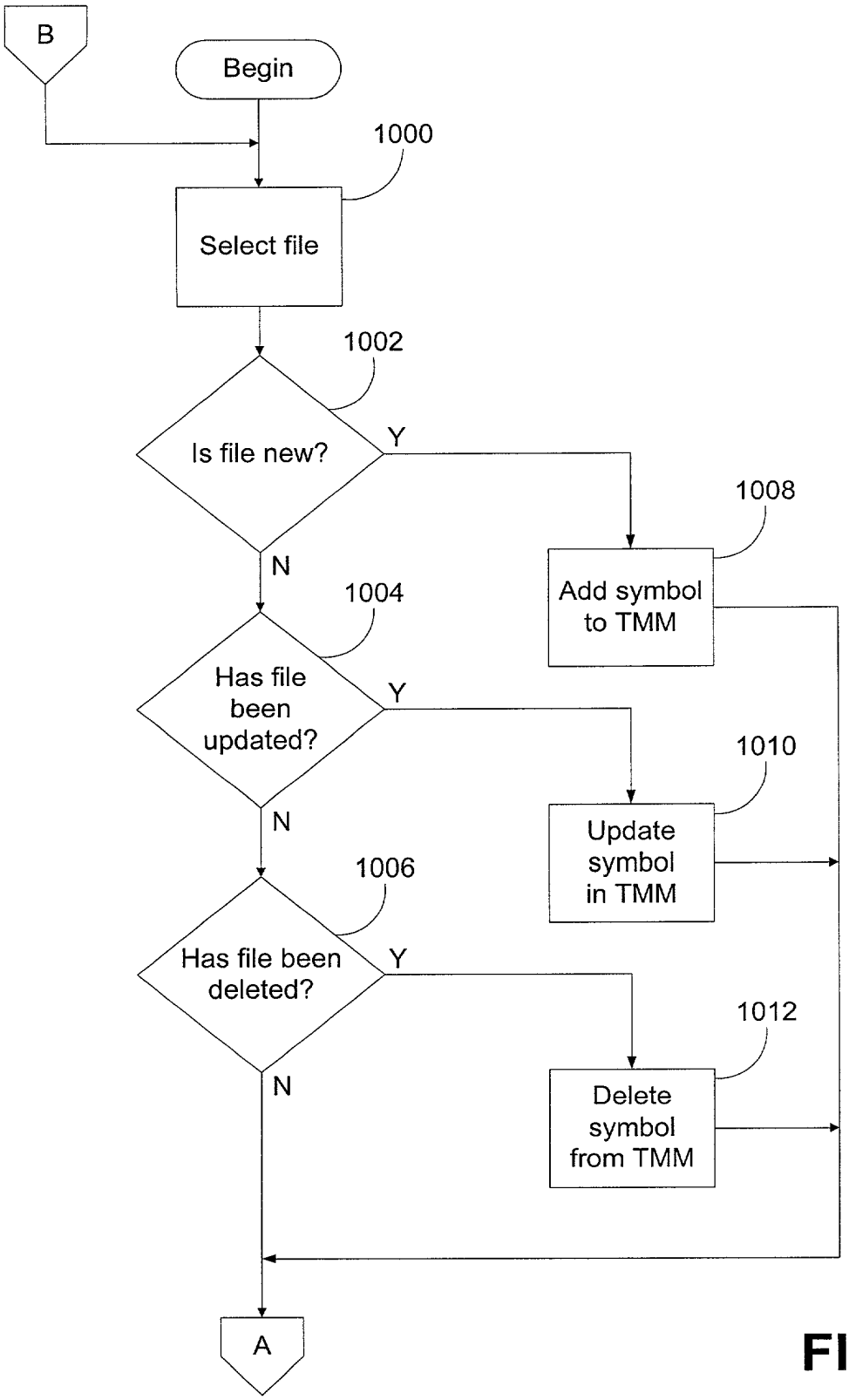

B
Begin
1000
Select file
1002
Is file new?
Y
N
1008
Add symbol to TMM
1004
Has file been updated?
Y
N
1010
Update symbol in TMM
1006
Has file been deleted?
Y
N
1012
Delete symbol from TMM
A

FIG. 10A

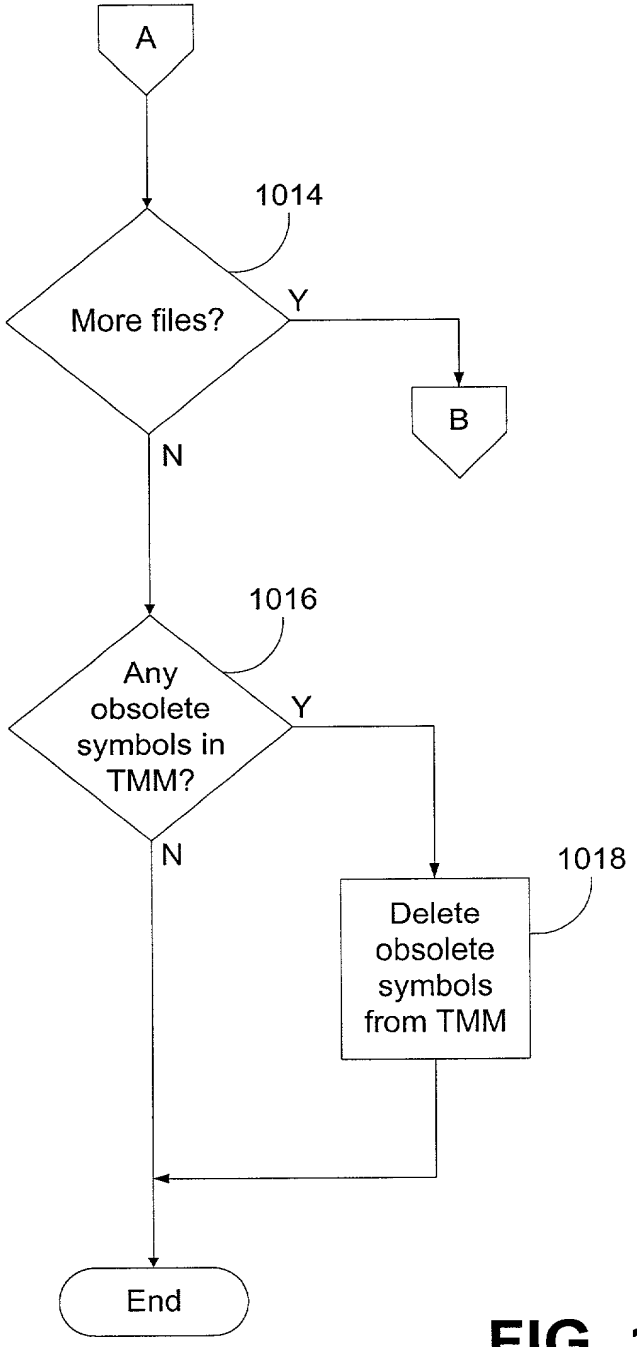

A
1014
More files?
Y
B
N
1016
Any obsolete symbols in TMM?
Y
N
1018
Delete obsolete symbols from TMM
End

FIG. 10B

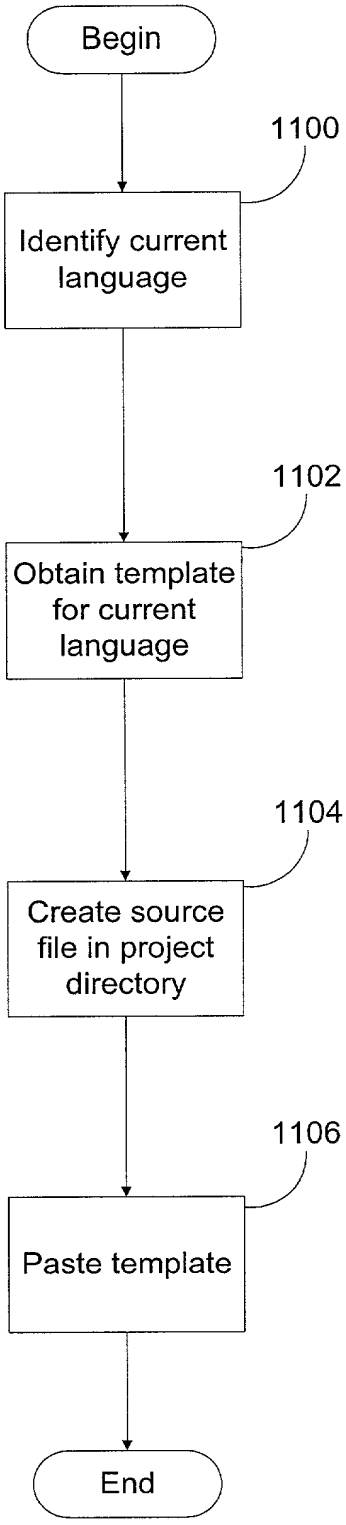

Begin
1100
Identify current language
1102
Obtain template for current language
1104
Create source file in project directory
1106
Paste template
End

FIG. 11

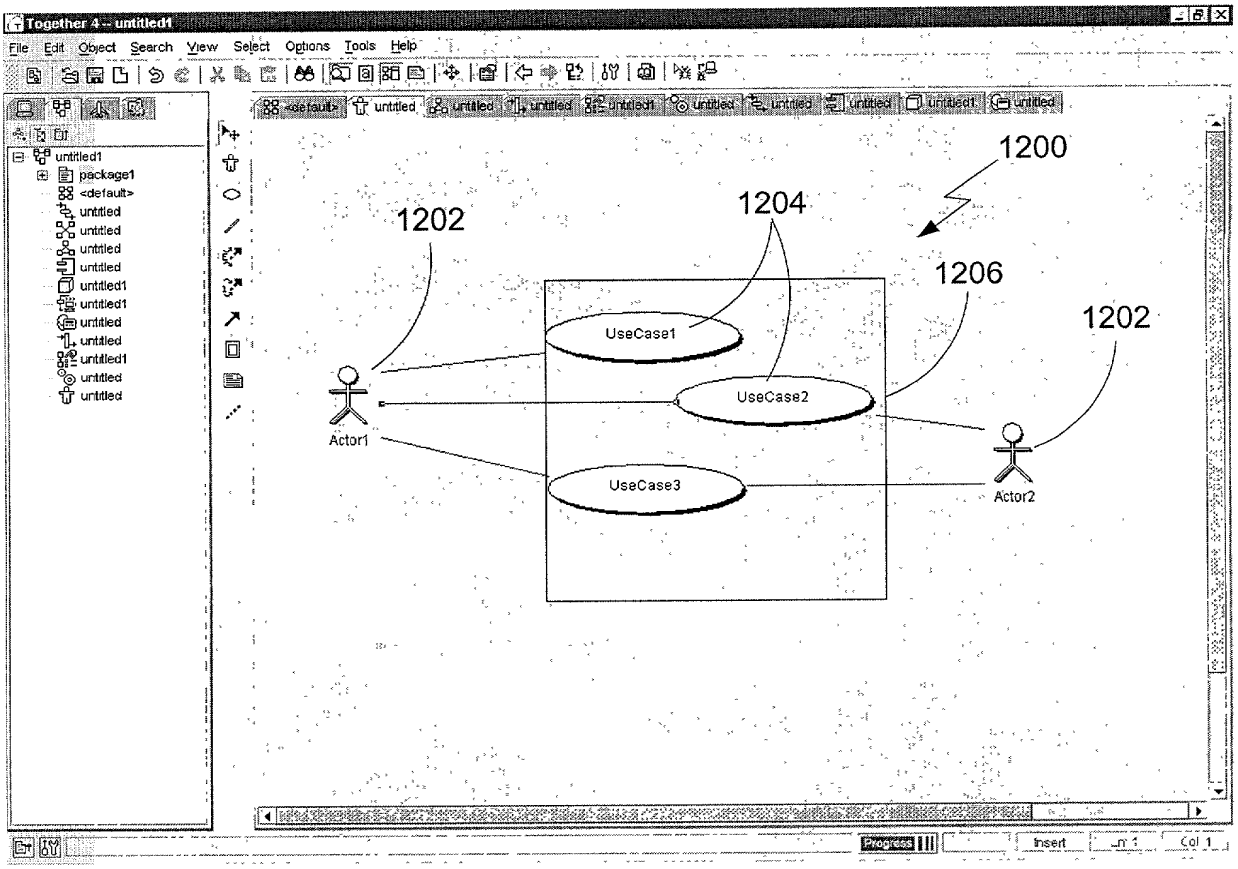

Together 4 -- untitled1
File Edit Object Search View Select Options Tools Help
untitled1
package1
<default>
1200
1202
1204
1206
1202
UseCase1
UseCase2
UseCase3
Actor1
Actor2
Insert

FIG. 12

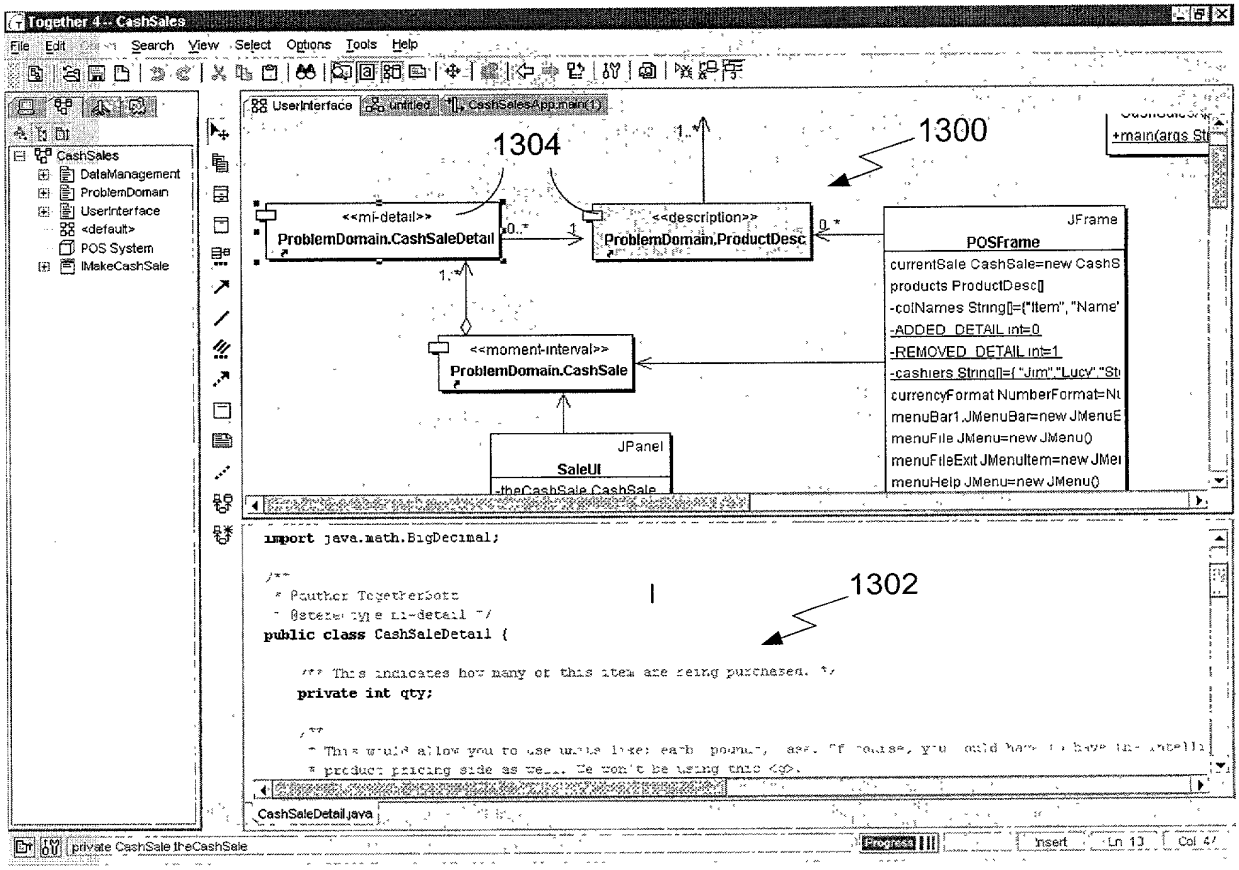

Together 4 -- CashSales
File Edit Search View Select Options Tools Help
CashSales
DataManagement
ProblemDomain
UserInterface
<default>
POS System
IMakeCashSale
UserInterface
Untitled
CashSalesApp.main()
1304
1300
<<mi-detail>>
ProblemDomain.CashSaleDetail
<<description>>
ProblemDomain.ProductDesc
JFrame
POSFrame
currentSale CashSale=new CashS
products ProductDesc[]
-colNames String[]={"Item","Name"
-ADDED_DETAIL int=0
-REMOVED_DETAIL int=1
-cashiers String[]={"Jim","Lucy","St
currencyFormat NumberFormat=Nu
menuBar1 JMenuBar=new JMenuE
menuFile JMenu=new JMenu()
menuFileExit JMenuItem=new JMe
menuHelp JMenu=new JMenu()
<<moment-interval>>
ProblemDomain.CashSale
JPanel
SaleUI
-theCashSale CashSale
import java.math.BigDecimal;
1302
public class CashSaleDetail {
private int qty;
CashSaleDetail.java
private CashSale theCashSale
Progress
Insert
Ln 13
Col 47

FIG. 13

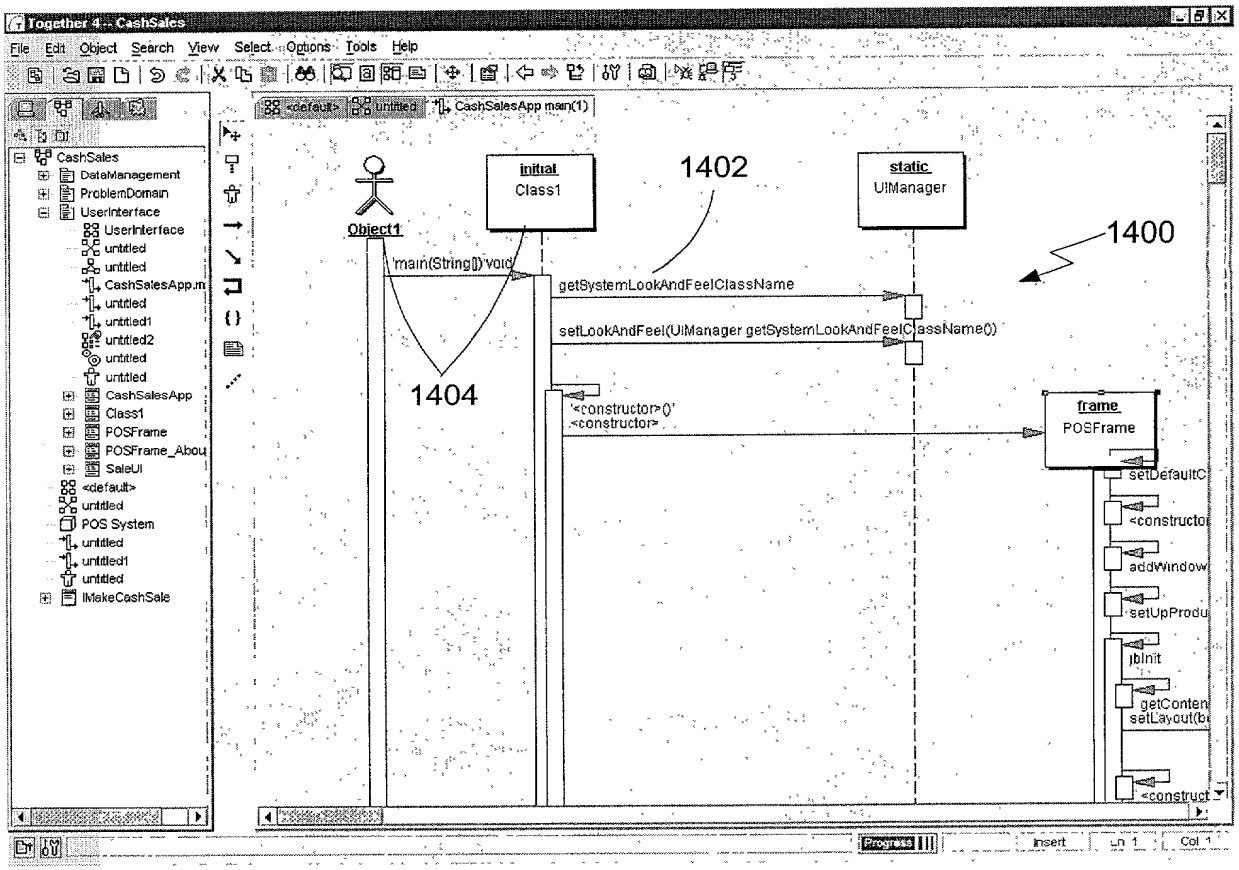

Together 4 - CashSales
File Edit Object Search View Select Options Tools Help
CashSales
DataManagement
ProblemDomain
UserInterface
UserInterface
untitled
untitled
CashSalesApp.m
untitled
untitled1
untitled2
untitled
untitled
CashSalesApp
Class1
POSFrame
POSFrame_Abou
SaleUI
<default>
untitled
POS System
untitled
untitled1
untitled
IMakeCashSale
<default>
untitled
CashSalesApp main(1)
Object1
initial
Class1
1402
static
UIManager
1400
main(String[]):void
getSystemLookAndFeelClassName
setLookAndFeel(UIManager getSystemLookAndFeelClassName())
1404
'<constructor>()'
<constructor>
frame
POSFrame
setDefaultC
<constructo
addWindow
setUpProdu
jbInit
getConten
setLayout(b
<construct
Insert
Ln 1
Col 1

FIG. 14

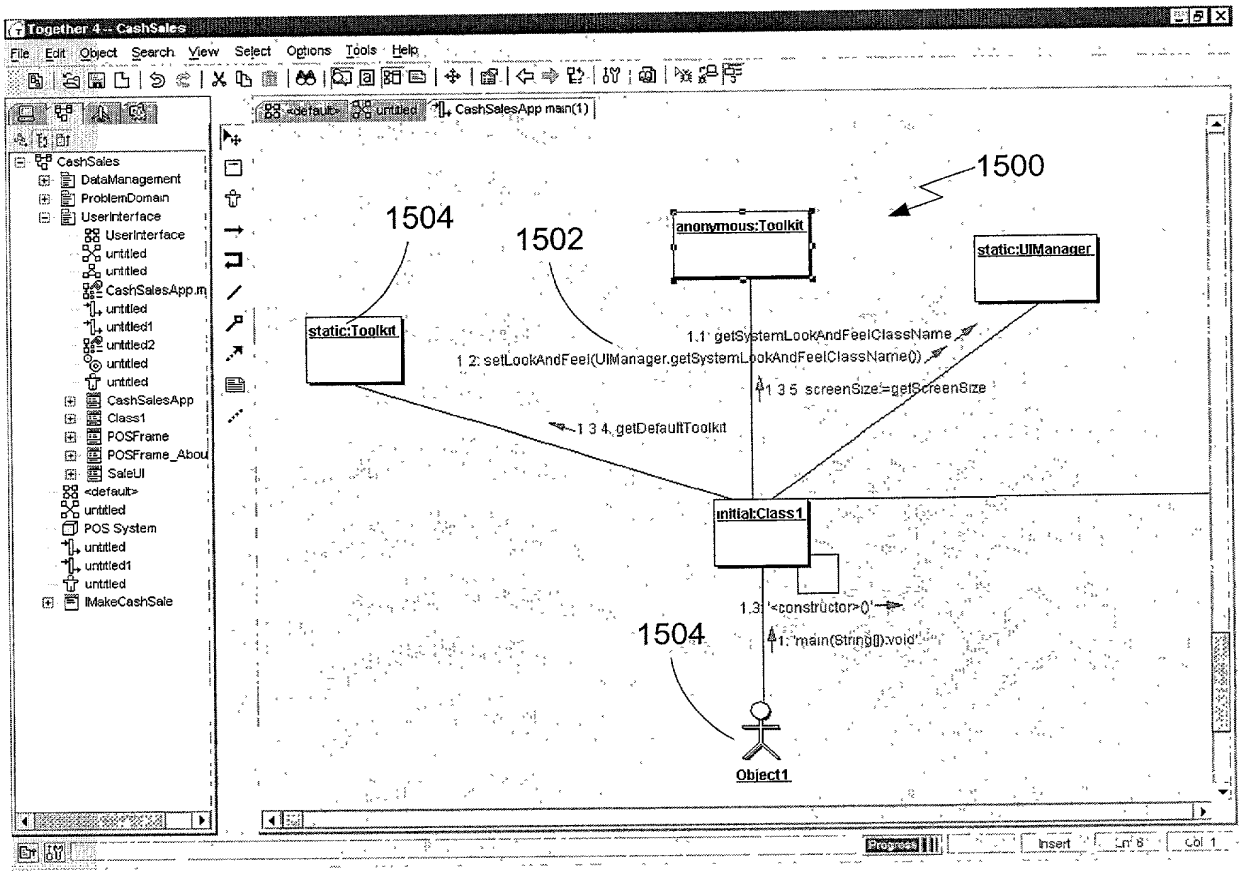

Together 4 -- CashSales
File Edit Object Search View Select Options Tools Help
CashSales
DataManagement
ProblemDomain
UserInterface
UserInterface
untitled
untitled
CashSalesApp.m
untitled
untitled1
untitled2
untitled
untitled
CashSalesApp
Class1
POSFrame
POSFrame_Abou
SaleUI
<default>
untitled
POS System
untitled
untitled1
untitled
IMakeCashSale
<default>
untitled
CashSalesApp main(1)
1500
1504
1502
anonymous:Toolkit
static:UIManager
static:Toolkit
1.1: getSystemLookAndFeelClassName
1.2: setLookAndFeel(UIManager.getSystemLookAndFeelClassName())
1.3.5: screenSize:=getScreenSize
1.3.4: getDefaultToolkit
initial:Class1
1.3: '<constructor>()'
1: main(String[]):void
1504
Object1
Progress
Insert
Ln 8
Col 1

FIG. 15

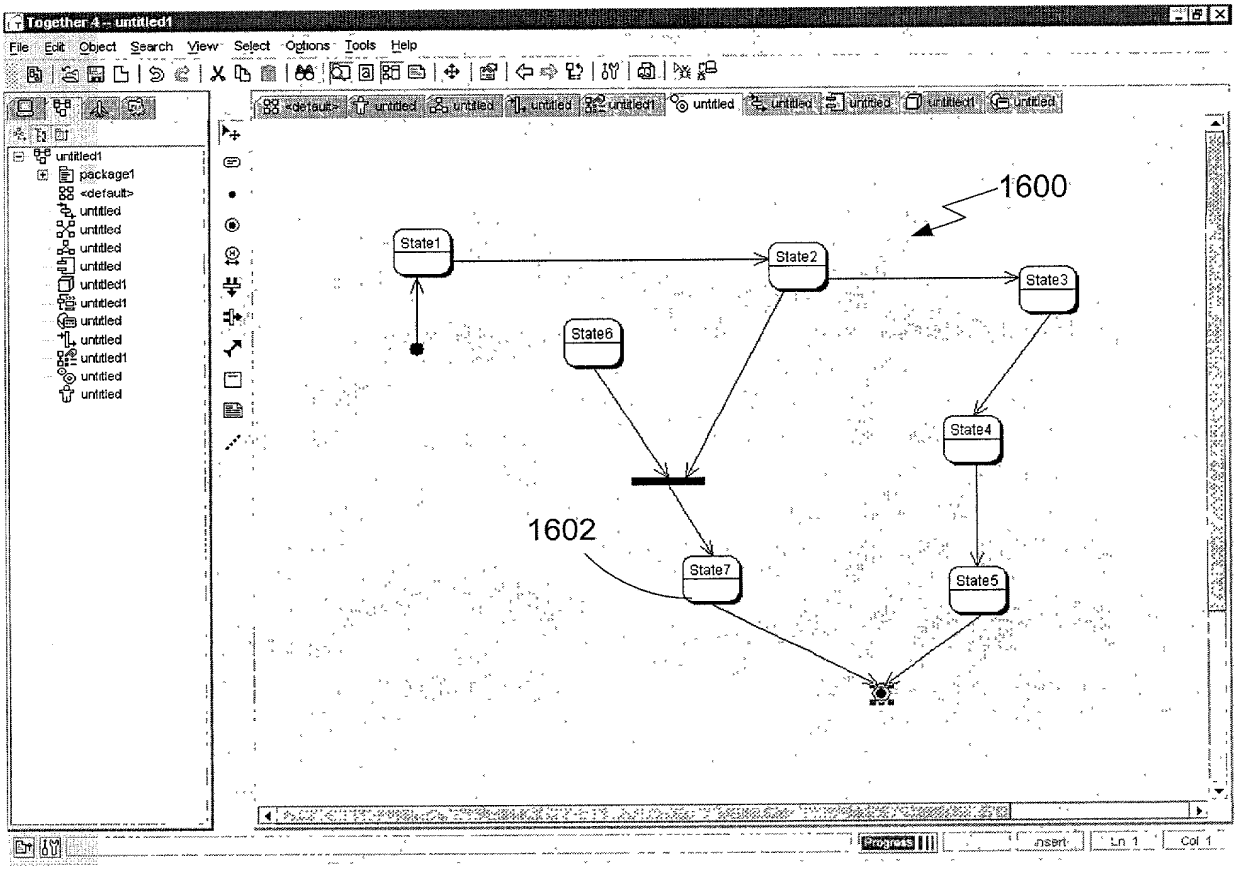

Together 4 -- untitled1
File Edit Object Search View Select Options Tools Help
untitled1
package1
<default>
1600
State1
State2
State3
State4
State5
State6
State7
1602
Progress
Insert
Ln 1
Col 1

FIG. 16

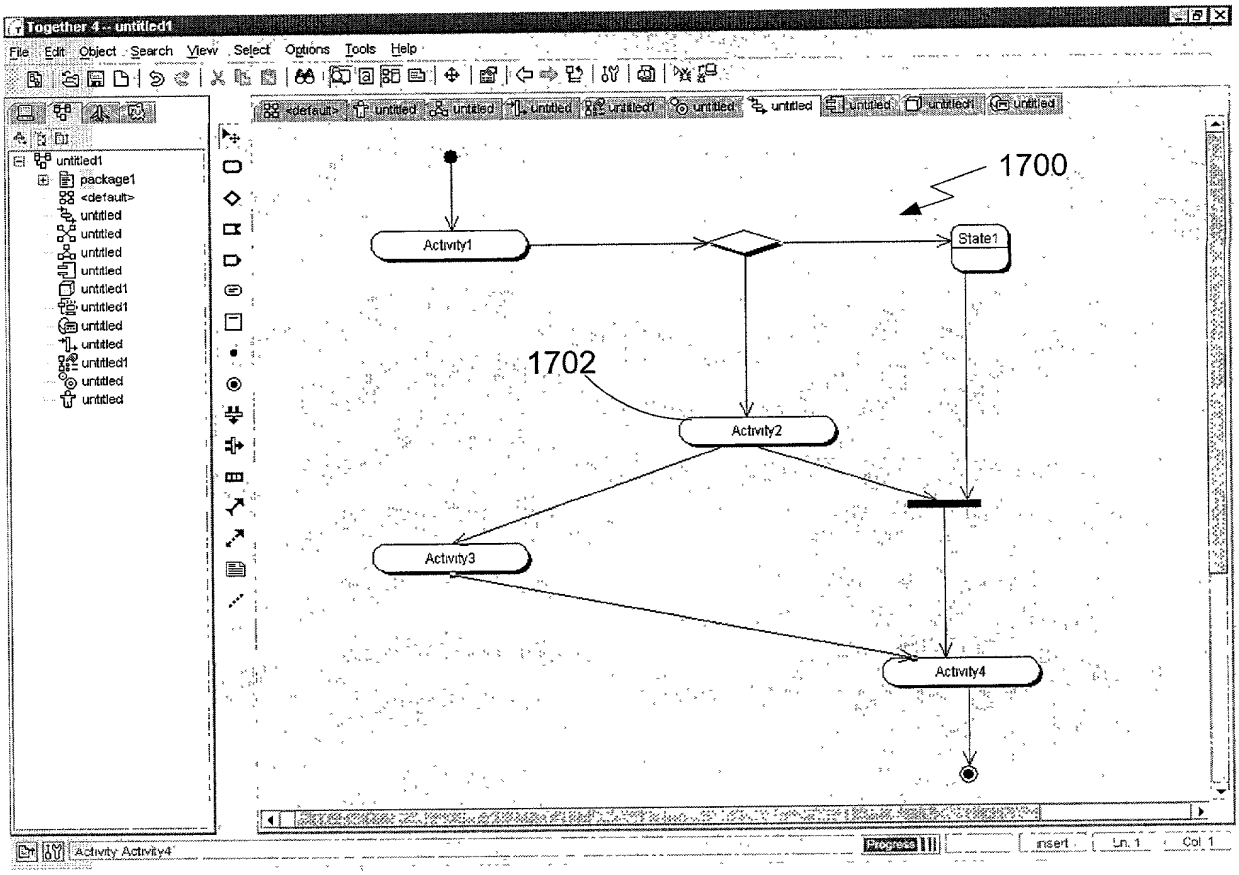

Together 4 -- untitled1
File Edit Object Search View Select Options Tools Help
untitled1
package1
<default>
1700
Activity1
State1
1702
Activity2
Activity3
Activity4
Activity Activity4
Process
insert
Ln. 1
Col. 1

FIG. 17

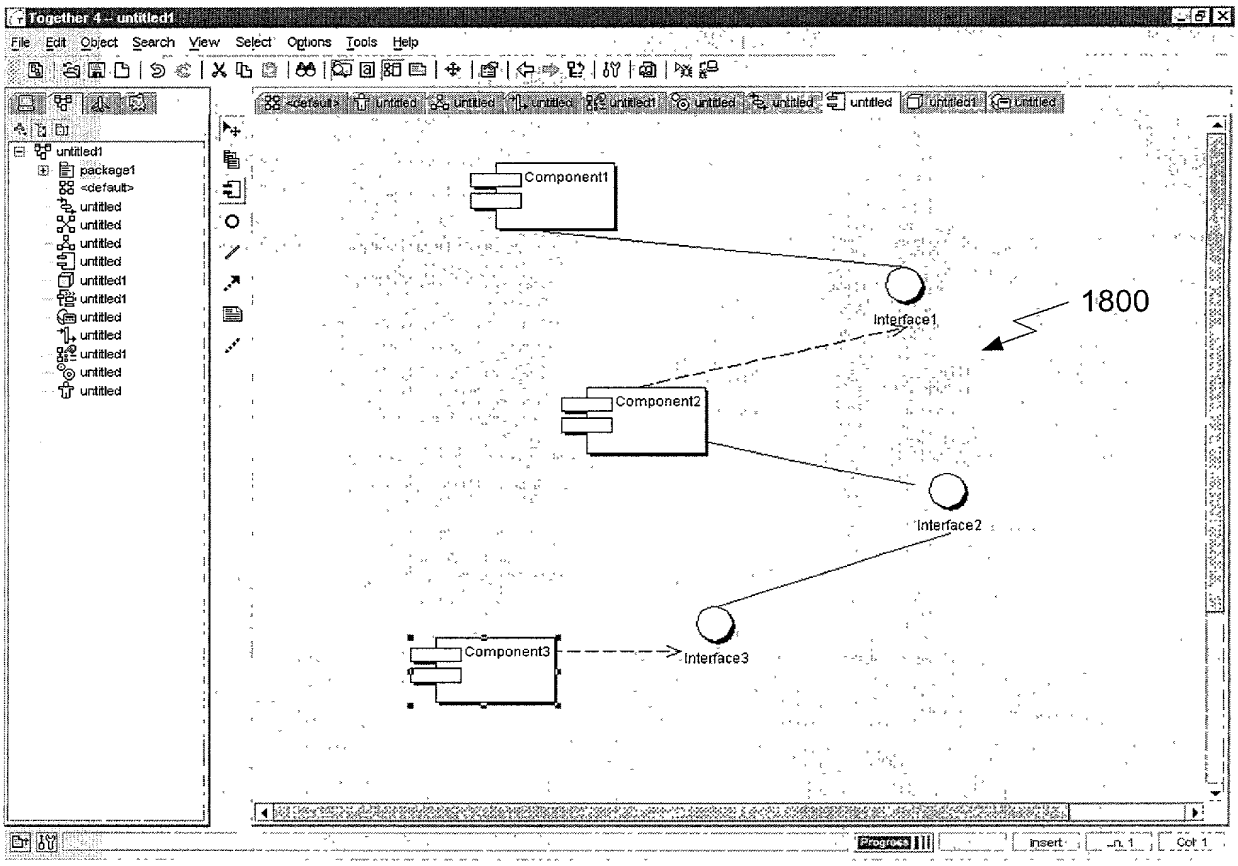

Together 4 -- untitled1
File Edit Object Search View Select Options Tools Help
untitled1
package1
<default>
Component1
Interface1
1800
Component2
Interface2
Component3
Interface3

FIG. 18

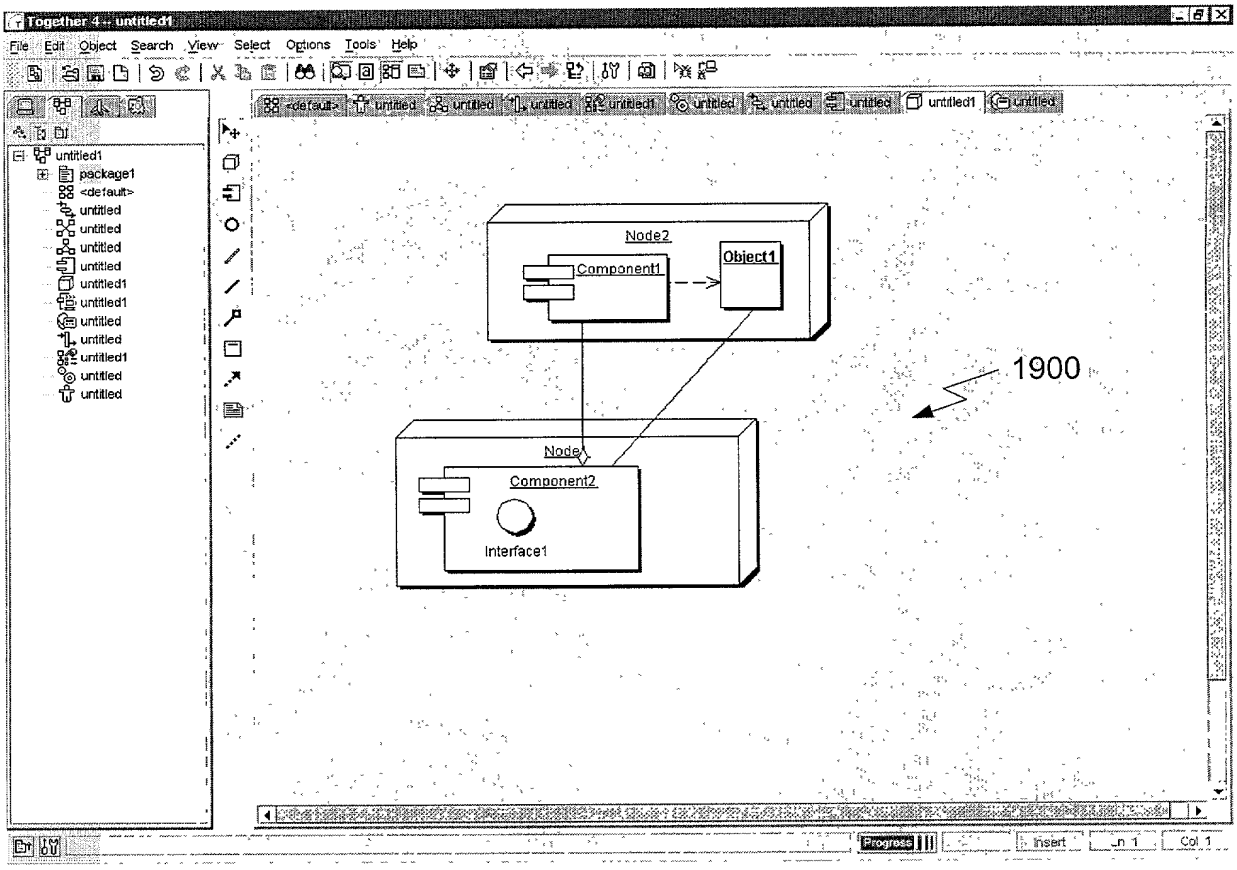

Together 4 - untitled1
File Edit Object Search View Select Options Tools Help
untitled1
package1
<default>
untitled
untitled
untitled
untitled
untitled1
untitled1
untitled
untitled
untitled1
untitled
untitled
Node2
Component1
Object1
1900
Node
Component2
Interface1
Progress
Insert
Ln 1
Col 1

FIG. 19

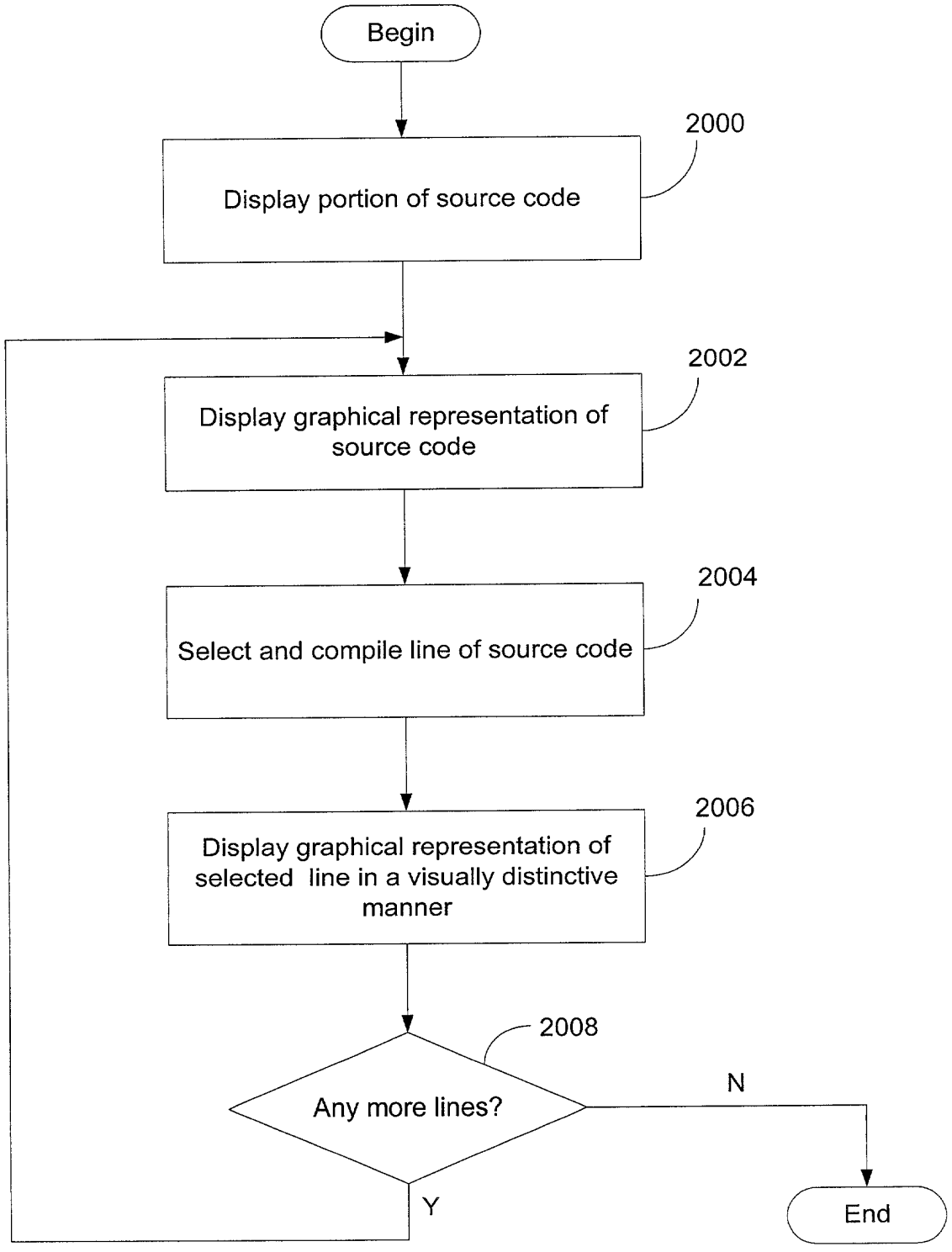
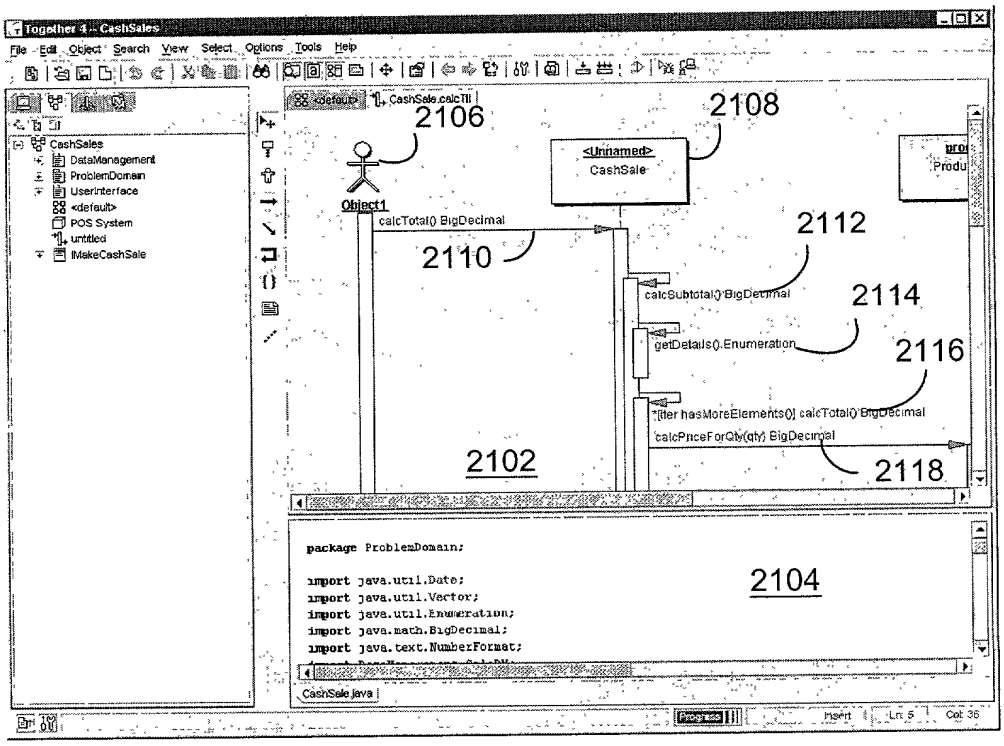
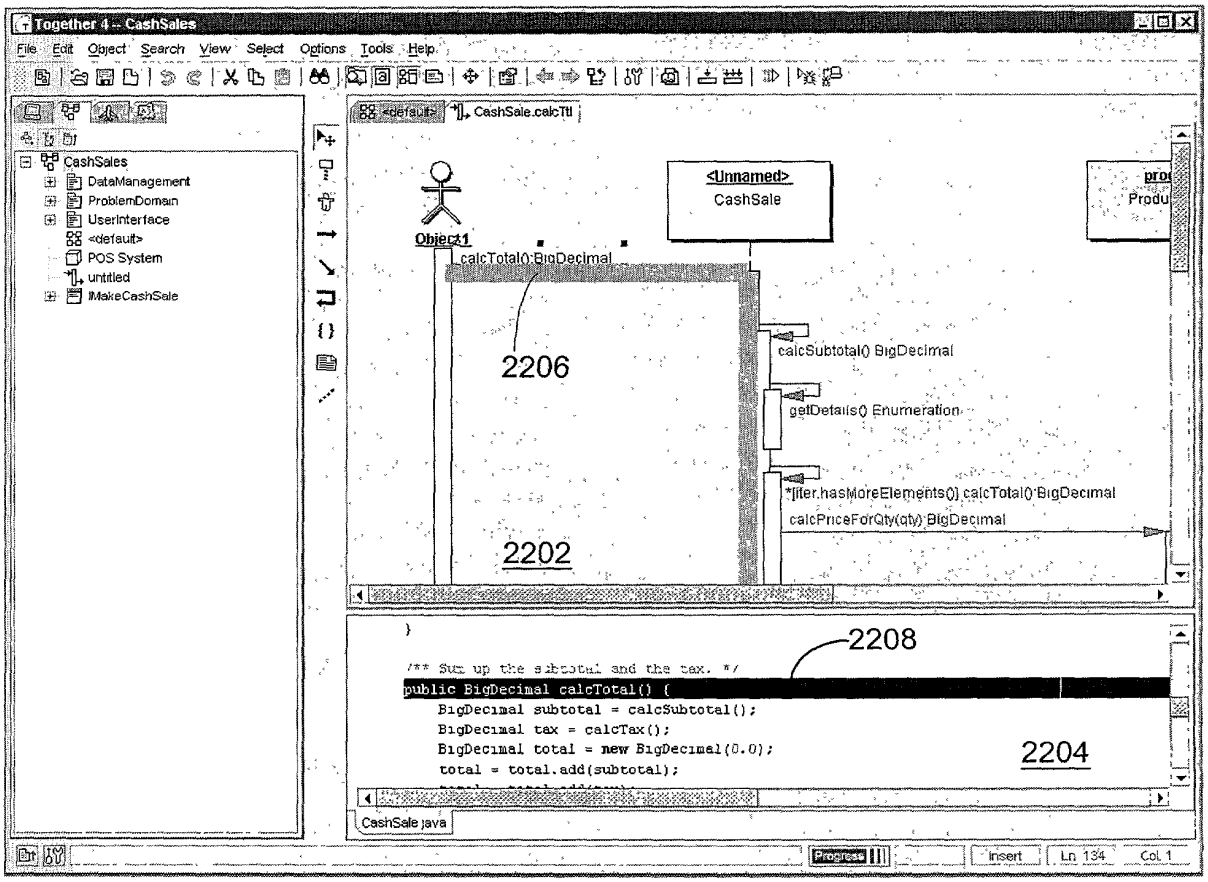

Begin
2000
Display portion of source code
2002
Display graphical representation of source code
2004
Select and compile line of source code
2006
Display graphical representation of selected line in a visually distinctive manner
2008
Any more lines?
N
Y
End

FIG. 20


Together 4 - CashSales
File Edit Object Search View Select Options Tools Help
CashSales
DataManagement
ProblemDomain
UserInterface
<default>
POS System
untitled
IMakeCashSale
<default>
CashSale.calcTtl
2106
2108
<Unnamed>
CashSale
Object1
calcTotal() BigDecimal
2110
2112
calcSubtotal() BigDecimal
2114
getDetails().Enumeration
2116
*[iter.hasMoreElements()] calcTotal() BigDecimal
calcPriceForQty(qty) BigDecimal
2118
2102
package ProblemDomain;
import java.util.Date;
import java.util.Vector;
import java.util.Enumeration;
import java.math.BigDecimal;
import java.text.NumberFormat;
2104
CashSale.java
Progress
Insert
Ln 5
Col 36

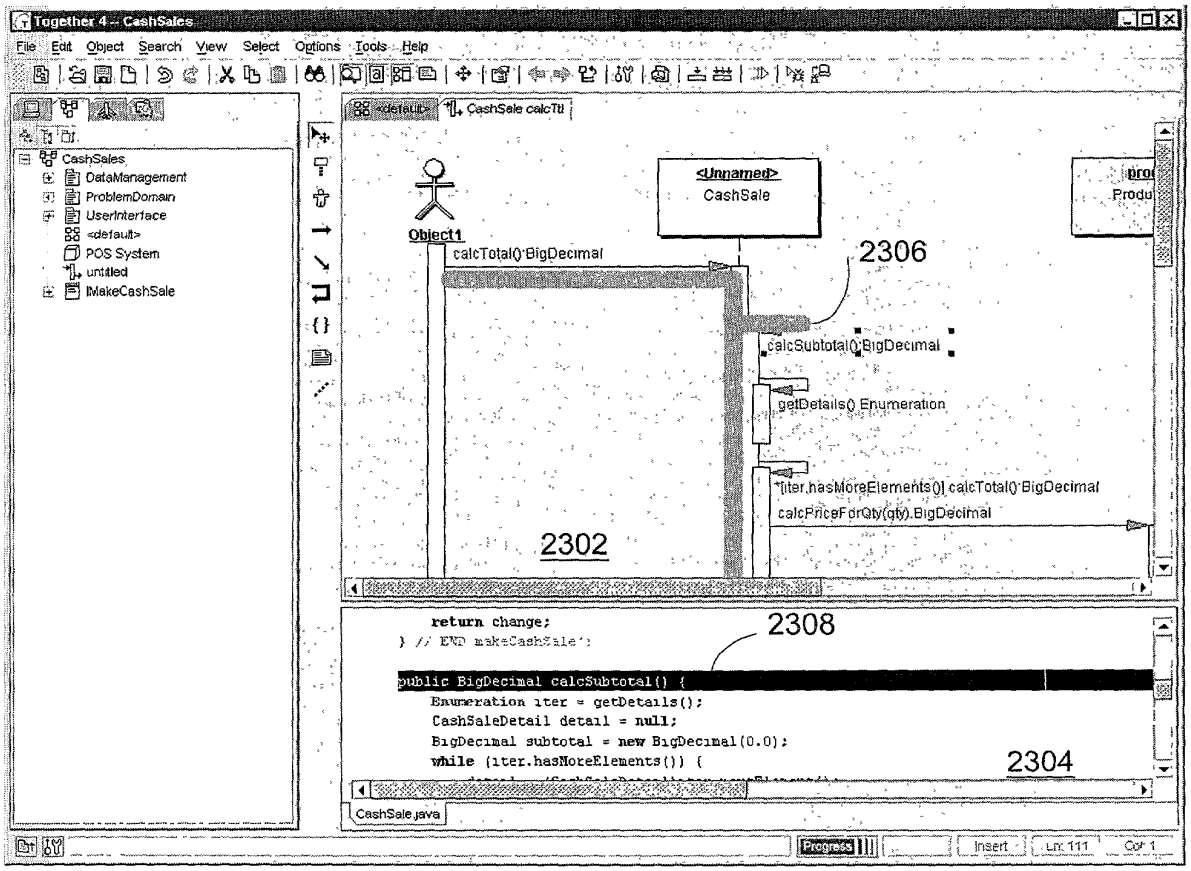
2100

FIG. 21


Together 4 - CashSales
File Edit Object Search View Select Options Tools Help
CashSales
DataManagement
ProblemDomain
UserInterface
<default>
POS System
untitled
MakeCashSale
<default>
CashSale.calcTtl
<Unnamed>
CashSale
Object1
calcTotal():BigDecimal
2206
calcSubtotal() BigDecimal
getDetails() Enumeration
*[iter.hasMoreElements()] calcTotal():BigDecimal
calcPriceForQty(qty) BigDecimal
2202
2208
/** Sum up the subtotal and the tax. */
public BigDecimal calcTotal() {
BigDecimal subtotal = calcSubtotal();
BigDecimal tax = calcTax();
BigDecimal total = new BigDecimal(0.0);
total = total.add(subtotal);
2204
CashSale.java
Progress
Insert
Ln 134
Col 1

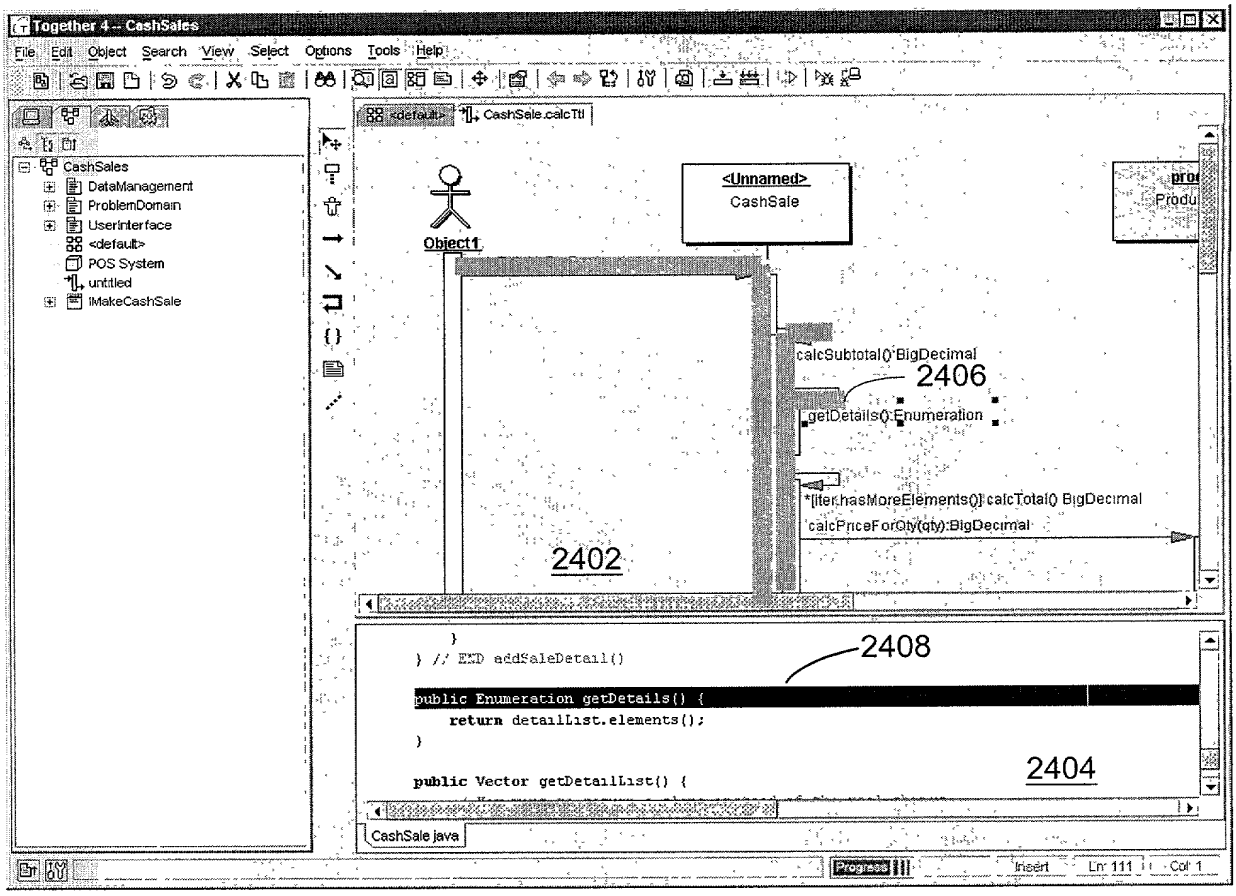
2200

FIG. 22


Together 4 -- CashSales
File Edit Object Search View Select Options Tools Help
CashSales
DataManagement
ProblemDomain
UserInterface
<default>
POS System
untitled
IMakeCashSale
<default>
CashSale calcTtl
<Unnamed>
CashSale
Object1
calcTotal():BigDecimal
2306
calcSubtotal():BigDecimal
getDetails():Enumeration
2302
calcPriceForQty(qty):BigDecimal
2308
return change;
} // END makeCashSale
public BigDecimal calcSubtotal() {
Enumeration iter = getDetails();
CashSaleDetail detail = null;
BigDecimal subtotal = new BigDecimal(0.0);
while (iter.hasMoreElements()) {
2304
CashSale.java
Progress
Insert
Ln: 111
Col: 1

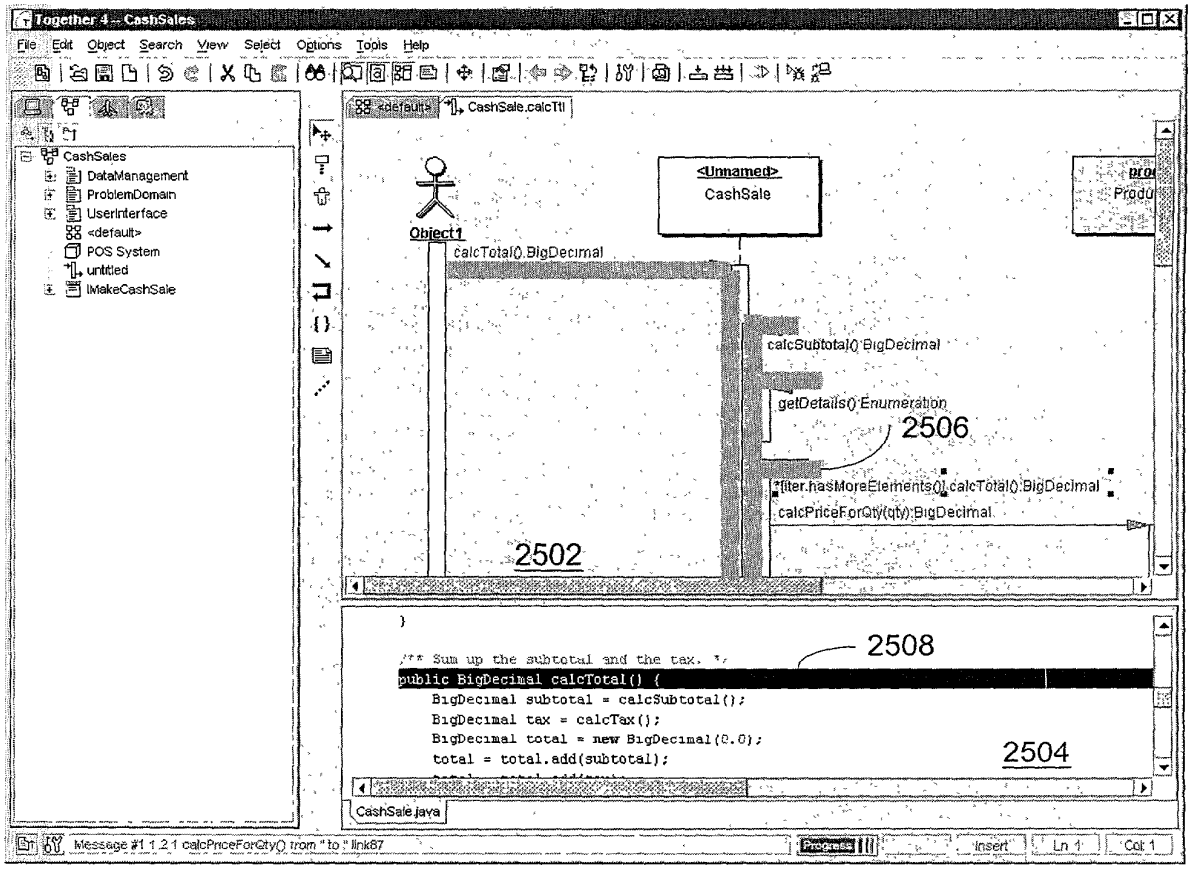
2300

FIG. 23


Together 4 -- CashSales
File Edit Object Search View Select Options Tools Help
CashSales
DataManagement
ProblemDomain
UserInterface
<default>
POS System
untitled
IMakeCashSale
<default>
CashSale.calcTtl
<Unnamed>
CashSale
Object1
calcSubtotal():BigDecimal
2406
getDetails():Enumeration
*[iter.hasMoreElements()] calcTotal() BigDecimal
calcPriceForQty(qty):BigDecimal
2402
2408
} // END addSaleDetail()
public Enumeration getDetails() {
return detailList.elements();
}
public Vector getDetailList() {
2404
CashSale.java
Progress
Insert
Ln: 111
Col: 1

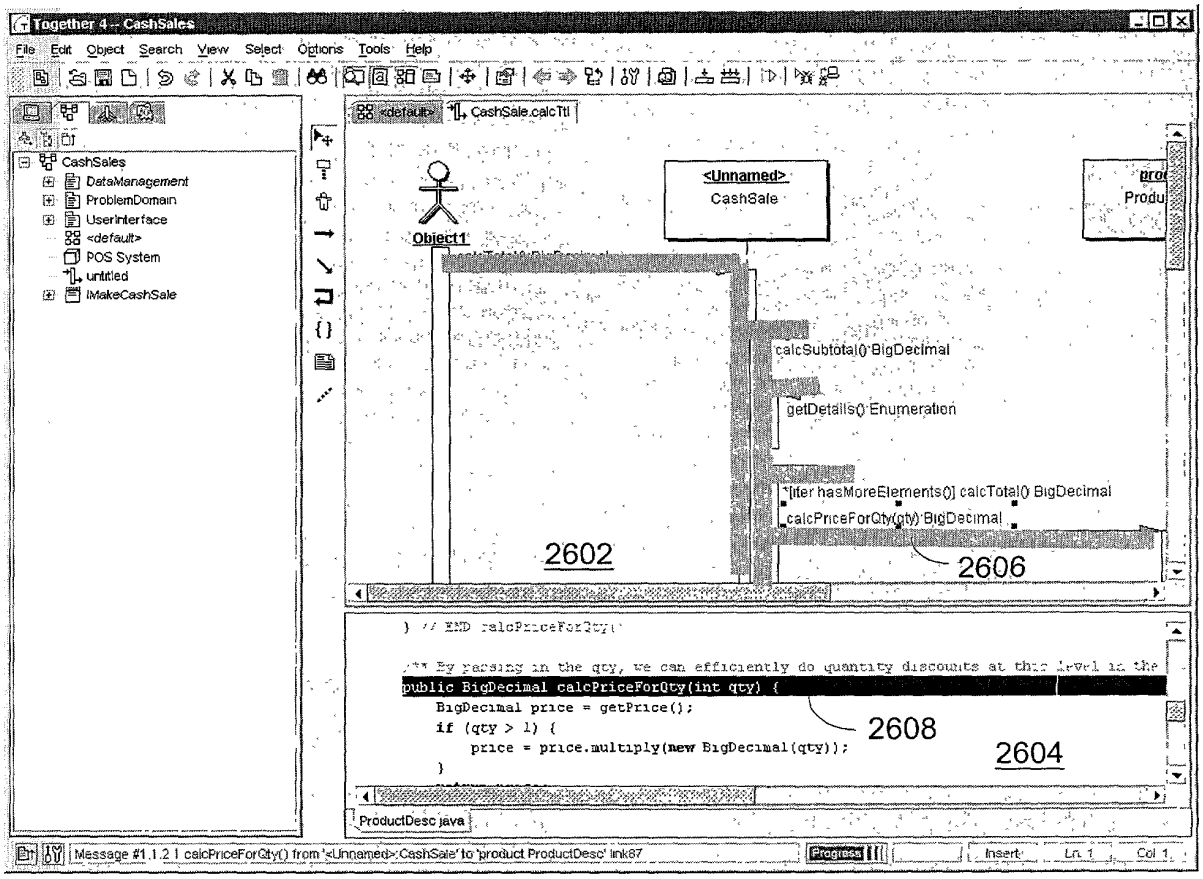
2400

FIG. 24


Together 4 - CashSales
File Edit Object Search View Select Options Tools Help
CashSales
DataManagement
ProblemDomain
UserInterface
«default»
POS System
untitled
IMakeCashSale
«default»
CashSale.calcTtl
Object1
calcTotal():BigDecimal
<Unnamed>
CashSale
calcSubtotal():BigDecimal
getDetails():Enumeration
2506
filter.hasMoreElements():calcTotal():BigDecimal
calcPriceForQty(qty):BigDecimal
2502
2508
/** Sum up the subtotal and the tax. */
public BigDecimal calcTotal() {
BigDecimal subtotal = calcSubtotal();
BigDecimal tax = calcTax();
BigDecimal total = new BigDecimal(0.0);
total = total.add(subtotal);
2504
CashSale.java
Message #1.1.2.1 calcPriceForQty() from '' to '' link87
Insert
Ln 1
Col 1

2500

FIG. 25


Together 4 -- CashSales
File Edit Object Search View Select Options Tools Help
CashSales
DataManagement
ProblemDomain
UserInterface
<default>
POS System
untitled
IMakeCashSale
<default>
CashSale.calcTtl
<Unnamed>
CashSale
Object1
calcSubtotal() BigDecimal
getDetails() Enumeration
[iter.hasMoreElements()] calcTotal() BigDecimal
calcPriceForQty(qty) BigDecimal
2602
2606
) // END calcPriceForQty(
/** By passing in the qty, we can efficiently do quantity discounts at this level in the
public BigDecimal calcPriceForQty(int qty) {
BigDecimal price = getPrice();
if (qty > 1) {
price = price.multiply(new BigDecimal(qty));
}
2608
2604
ProductDesc.java
Message #1.1.2 | calcPriceForQty() from '<Unnamed>:CashSale' to 'product ProductDesc' link87
Insert
Ln 1
Col 1

2600

FIG. 26

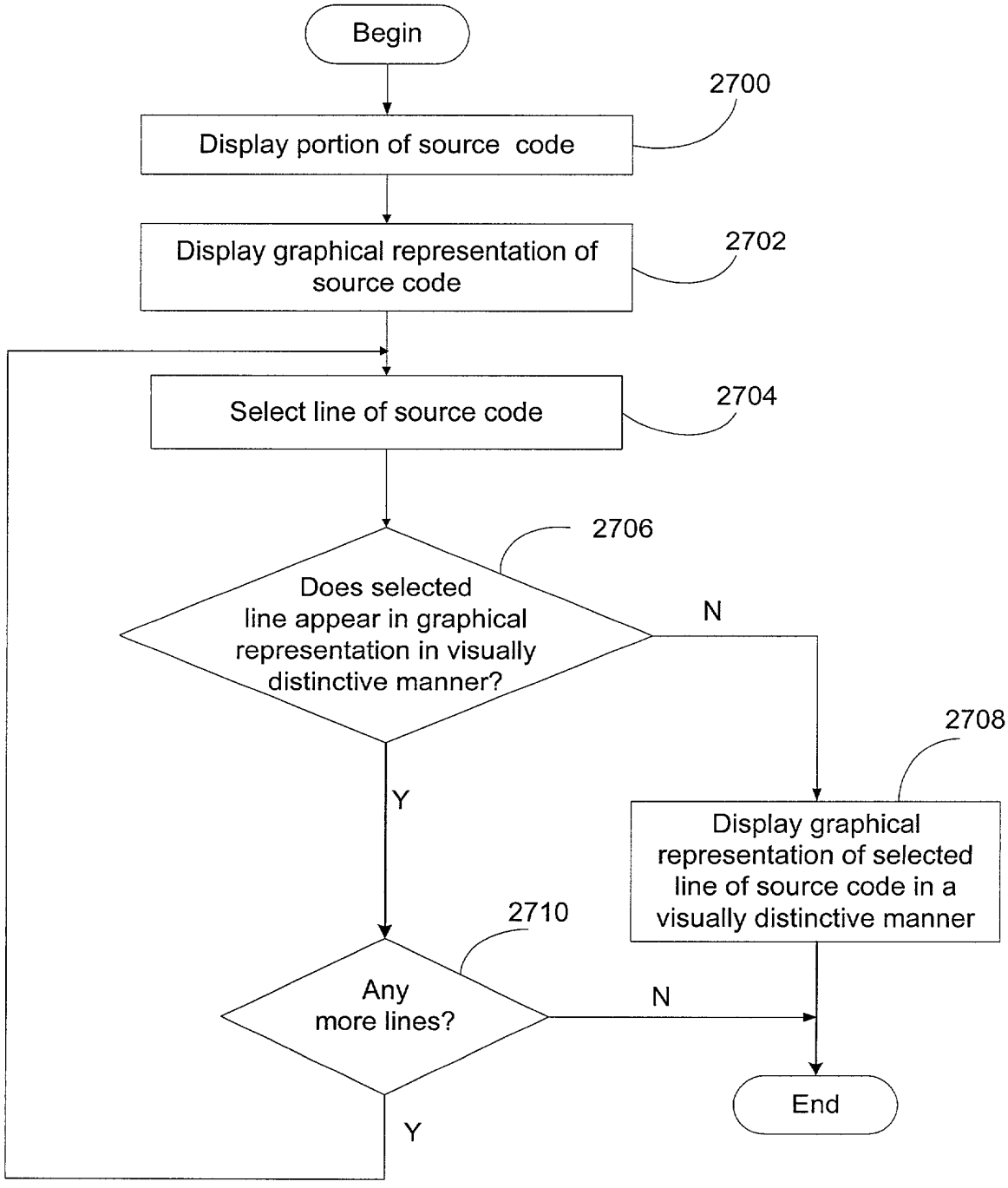

Begin
2700
Display portion of source code
Display graphical representation of source code
2702
Select line of source code
2704
2706
Does selected line appear in graphical representation in visually distinctive manner?
N
Y
2708
Display graphical representation of selected line of source code in a visually distinctive manner
2710
Any more lines?
N
Y
End

FIG. 27

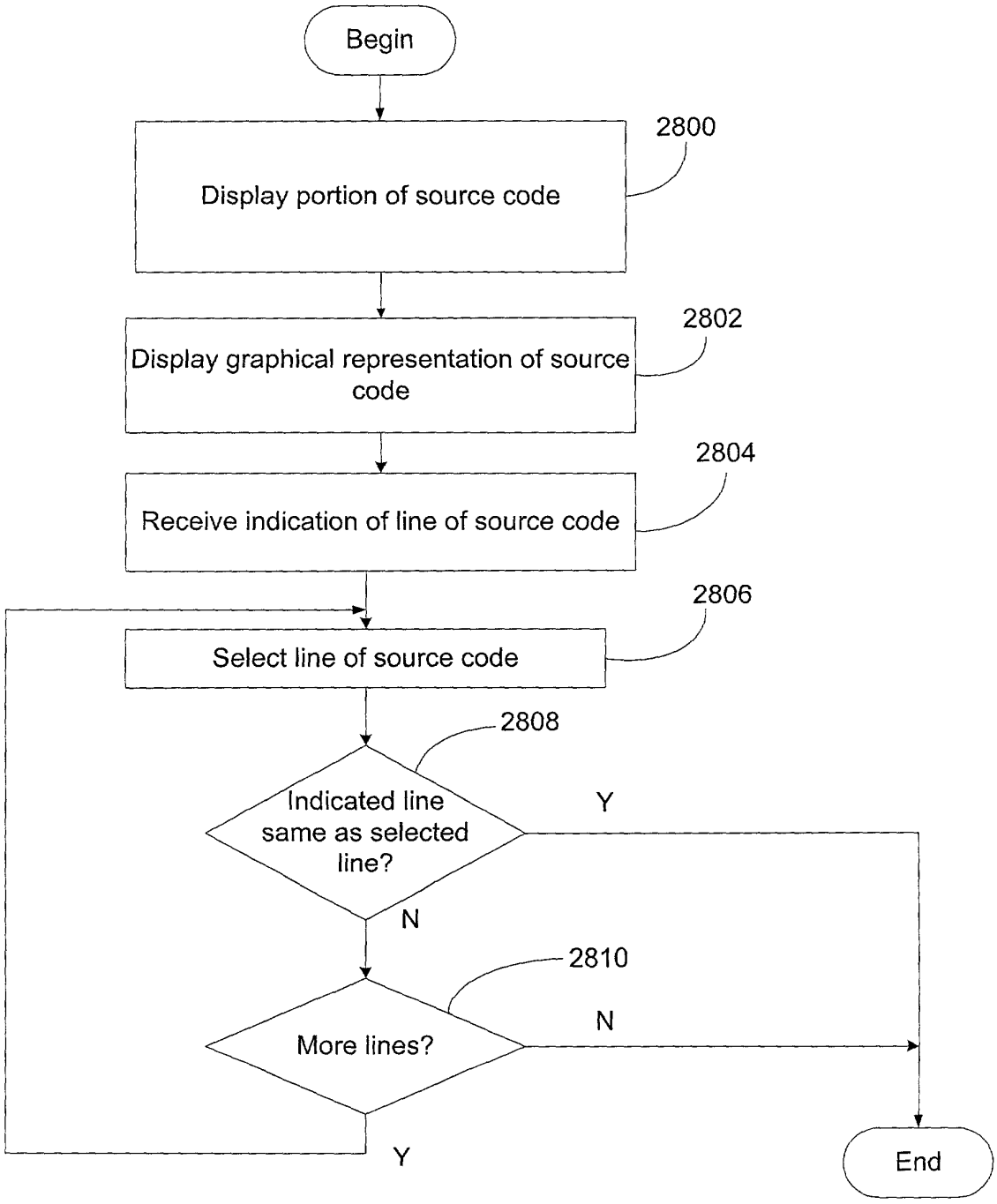

Begin
Display portion of source code
2800
Display graphical representation of source code
2802
Receive indication of line of source code
2804
Select line of source code
2806
Indicated line same as selected line?
2808
Y
N
More lines?
2810
N
Y
End

FIG. 28

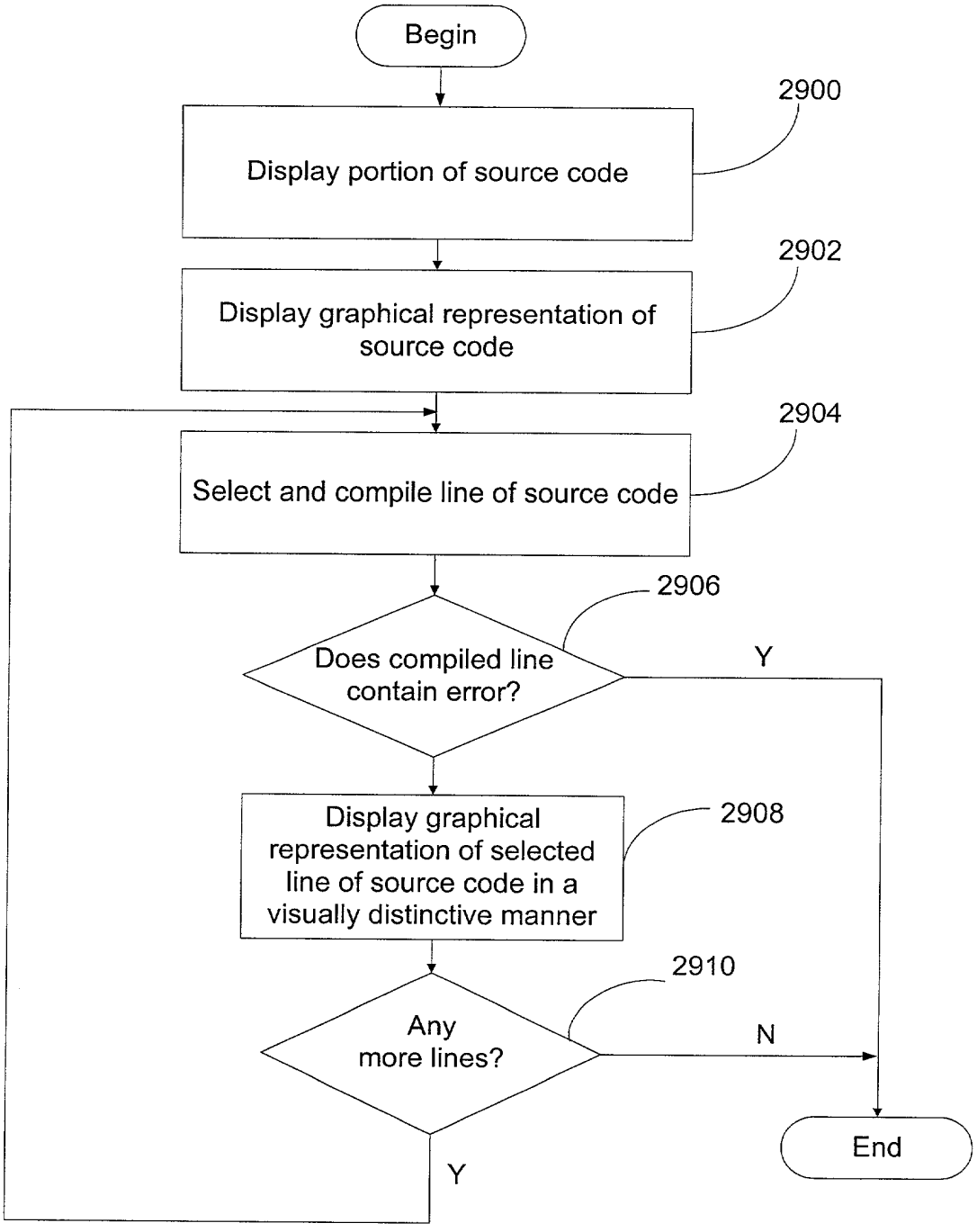

Begin
2900
Display portion of source code
2902
Display graphical representation of source code
2904
Select and compile line of source code
2906
Does compiled line contain error?
Y
2908
Display graphical representation of selected line of source code in a visually distinctive manner
2910
Any more lines?
N
Y
End

FIG. 29